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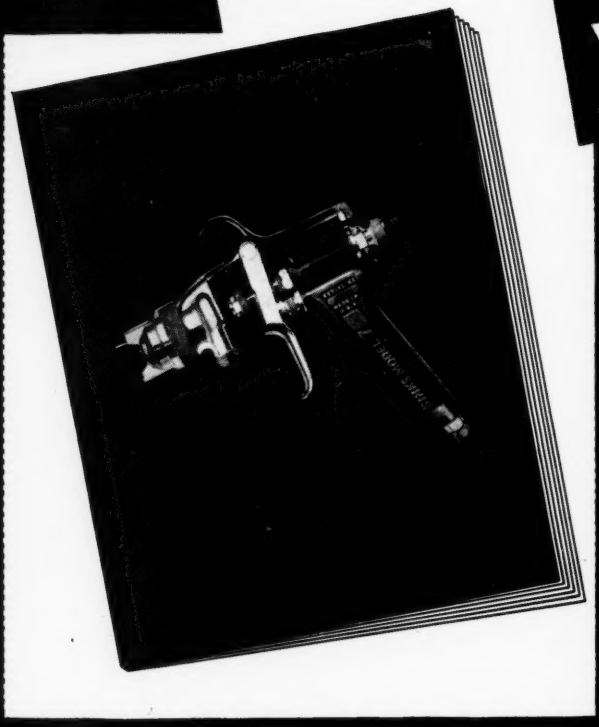

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Concentrate on Quality Plating

Although a frequently mentioned subject in these columns, the need for adequate thicknesses of electroplated coatings cannot be overemphasized. The percentage difference in costs between coatings which are too thin and those which are satisfactory is small in many cases. The quantity of metal and the current used represent a small proportion of the total cost of plating. Yet, in plating as in many other finishing operations, small cost differences may govern if the quality difference is not understood.

From the plater's standpoint, the competition of non-rusting metals, such as the stainless steels, demands that he look to the quality of his work. Often, the tendency is to assume that a lack of complaints means a satisfactory product. This, of course, is not necessarily true since some time must elapse before even a poor plating job shows signs of failure.

You must also consider that the plated article usually passes through several hands in the process of manufacture and distribution before reaching the ultimate consumer. Thus, these circumstances minimize the chances of a positive complaint coming back to the plater. Nevertheless, you have not prevented suspicion on the part of the consumer that all plated ware may be unreliable if several plated articles of unsatisfactory durability and service life are encountered. Such a state of mind makes the consumer receptive to competitive substitutes and has an unfavorable reaction on the entire plating industry.

Finishing Chrysler and DeSoto Passenger Car Bodies

By BRYANT W. POCOCK

BODY finishing procedure employed at Chrysler Corporation's Kercheval and Jefferson plants as functional and decorative ramifications of Chrysler and DeSoto passenger car production can be traced from body framing fixtures and stockpiles of fender, hood and other sheet metal stampings throughout production lines to final assembly, inspection and disposal.

In the "body in white" department at the Kercheval plant, wheelhouse panels, front and rear quarters, and so on, converge by monorail from several directions to body framing fixtures, where the individual stampings are assembled and welded together. Bodies are then transferred on skids to the finish lines by way of a lateral line of slat conveyors. The skids are transferred to 2 parallel lines of longitudinal conveyors according to style of body—all 4-door models conveyed on one line, the other line receiving 2-door models, as well as 3-passenger and 5-passenger coupes.

Initial operations on the finish lines include additional spot welding on underbodies and wheel housings and on rear seat reinforcements, after which considerable arc welding is done in a well-ventilated, enclosed hood for reinforcement of spot welds. Doors are fitted on the body shells and

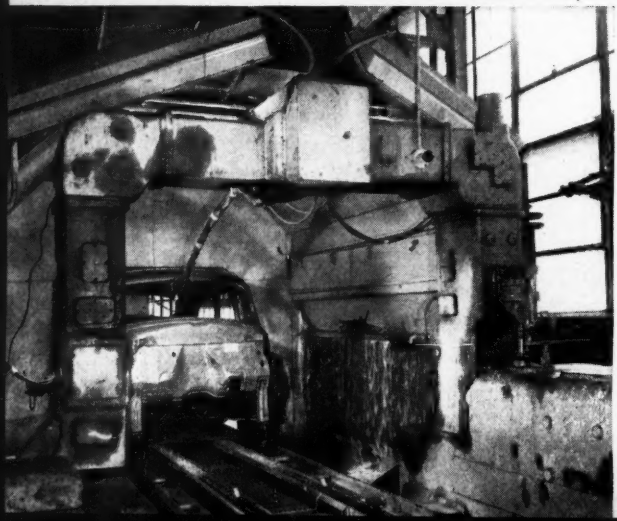

Fig. 1—Automatic spray machine for spraying primer-surfacer undercoat on passenger car bodies in "body in white" department of Chrysler Corporation's Kercheval plant

Fig. 2 — Huge gas-fired infra-red oven used for baking primer-surfacer undercoat in "body in white" department of Chrysler Corporation's Kercheval plant

solder is applied and built up over welded areas and joints. All soldered areas are painstakingly filed to proper surface contour by a graduated series of hand operations, after which a proprietary potash-clay compound is liberally applied by brush over the soldered regions. This compound is thoroughly burned on by the use of gas-air torches and has the effect of neutralizing and absorbing acid, flux and oil. Bodies are then transferred to a wash, phosphatize, and primer line. Immediately after transfer, bodies are touched up by hand with gasoline and phosphoric acid over the coated zones, after which the potash-clay mixture is brushed off by hand, taking with it all traces of acid, flux and oil.

Bodies are next conveyed through a large, multiple-stage combination spray type washing and phosphatizing installation, within which they are subjected to the following individual operations in order:

1. Bodies pass through a horseshoe type washer, where they are sprayed with clear, hot water.

2. They pass through an automatic washer under pump pressure, where they are sprayed with hot alkali cleaner emulsified in the presence of phosphoric acid.

3. They pass through a second sprayed water rinse provided in a horseshoe type washing installation.

4. They pass through another clear water spray under pressure.

5. Hot phosphate coating is sprayed on under pressure.

6. Hot, clear water rinse, horseshoe type washer.

7. Hot, clear water rinse, horseshoe type washer.

8. Hot, clear water rinse, sprayed under pressure.

9. Bodies are sprayed with hot chromic acid.

On emerging from the phosphatizing installation, bodies are given a hand-operated compressed air blow-off. Hand spotting operations follow, during which glaze is applied with putty knives over soldered areas to eliminate file marks. Bodies then pass on a single line through a 60-ft. drying oven which is maintained at 350 degrees F. After sound deadener has been sprayed on the inner surfaces of cowls and sealer material sprayed over seams, a second application of glaze is made over areas where double glazing is considered advisable. A gasoline wipe-off operation succeeds final glazing where necessary, and

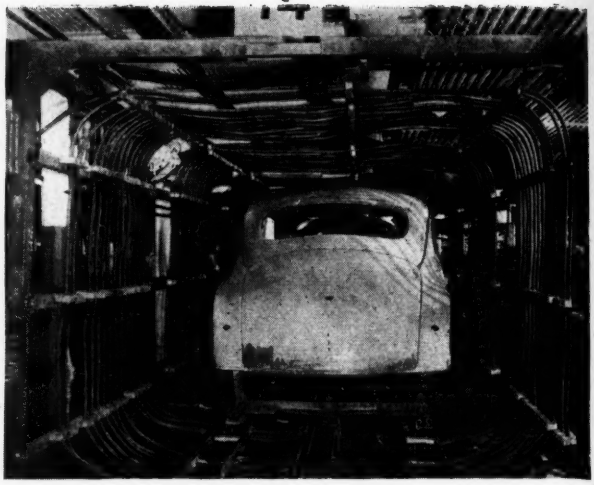

Fig. 3 — Chrysler-engineered induction type dry-off heater used on 7th floor of Kercheval plant for rapidly drying passenger car bodies after hot water rinse

final glazing where necessary, and this is followed by tack-ragging.

Bodies are then passed through a Chrysler - designed automatic spray machine, as shown in Fig. 1, to receive first coating of combination primer surfacer undercoat. This machine is engineered to spray into a double water-washed booth, which functions as a combination spray booth and machine housing. Bodies, on entering the machine, trip limit switches which actuate mechanisms driving and operating 3 automatic spray guns. Two of these, mounted laterally, operate from the sides; the other is overhead and serves to spray the tops of bodies. All three guns follow body contour in movement and in direction of spray, and all three swing back and forth during their spraying cycles, their movements being controlled to cover the entire exterior surface of the bodies without wasting paint by overspray or through irregular application.

After an appropriate set-up time, bodies are passed through a pair of

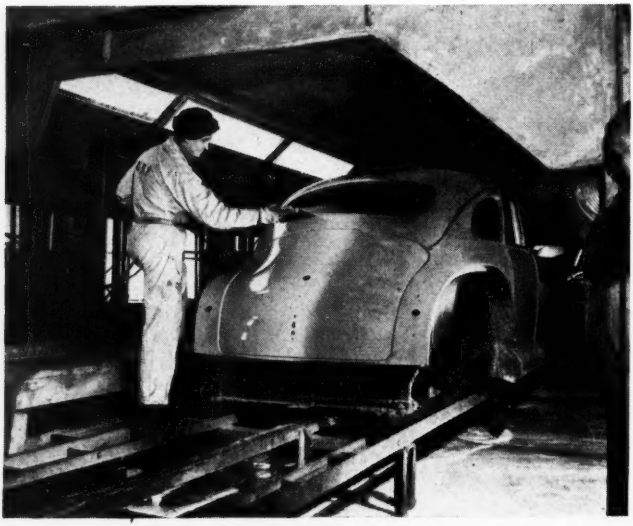

Fig. 4 — Color booth on 7th floor of Chrysler Corporation's Kercheval plant where finish enamel is sprayed on bodies for passenger cars. Note assortment of spray hoses and guns available for different colors.

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Fig. 5—Polishing operations being performed on fenders for passenger cars in Chrysler Corporation's sheet metal building. Note exhaust dust catcher which travels with conveyor.

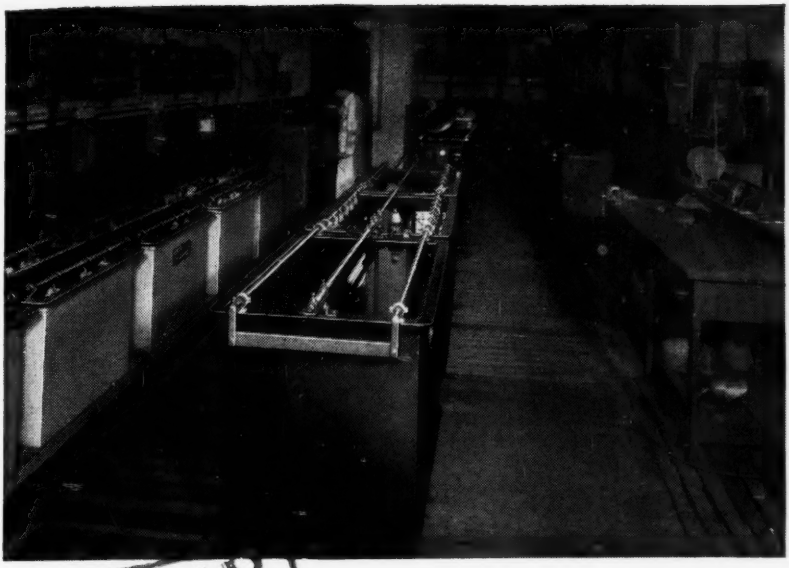
criss-cross, water-washed booths, where they receive their second application of primer-surfacer undercoat. Then, still on their original skids, they are transferred to 2 lines which are passed through parallel infra-red drying ovens of the type shown in Fig 2. These ovens are 200 ft. in length, gas-fired, and automatically controlled.

Bodies are now conveyed on the same skids by overhead monorail through an inclined and enclosed bridge to the 7th floor of the main Kercheval body plant. Part way up, and before leaving the "metal shop," they receive their underbody spray coat during their upward transit. Arriving on the 7th floor, the bodies are unhooked from the monorail, and all doors are opened and secured slightly ajar by means of special hooks which keep them open approximately one inch. This prevents subsequent paint coats from sticking opposing surfaces together by keeping these apart until final baking has been completed. Marine batten cement is then gunned along the inside of drip moldings to make them waterproof. This material sets and becomes sufficiently hard for all practical purposes, but never becomes brittle or chips off.

Bodies are next subjected to a water spray, after which water sanding is begun on body and cowl tops by manual operation of double vibrator type sanding machines, 2 operators working simultaneously on opposite sides with No. 280 grit sandpaper. Several stages of hand water sanding of bodies follow, using 320 grit paper over all outside surfaces and door jambs, followed by inspection for file marks and dings. Bodies are then water sponged by hand and passed through a horseshoe type air "halo" for drying. This is followed by a hand blow-off with compressed air and transfer to a single line for application of seal coat.

The entire outside and inside of bodies are sprayed with a neutral sealer enamel, including interiors of trunk compartments, undersides of trunk lids, and sills, in a pair of criss-cross, water-washed booths. This application has been shown to be very effective in preventing the rusting of sills (modern term for streamlined interior improvements on old-fashioned running boards). Transfer to a double line is followed by passage through the sealer coat bake oven, again a gas-fired infra-red type, passage taking 20 minutes to cover 190 ft. at a temperature of 300 degrees Fahrenheit.

Exit from the oven is followed immediately by water cooling under a horseshoe type halo spray. Several hand water sanding operations now follow, using 320 grit sandpaper. Bodies are then washed with clean



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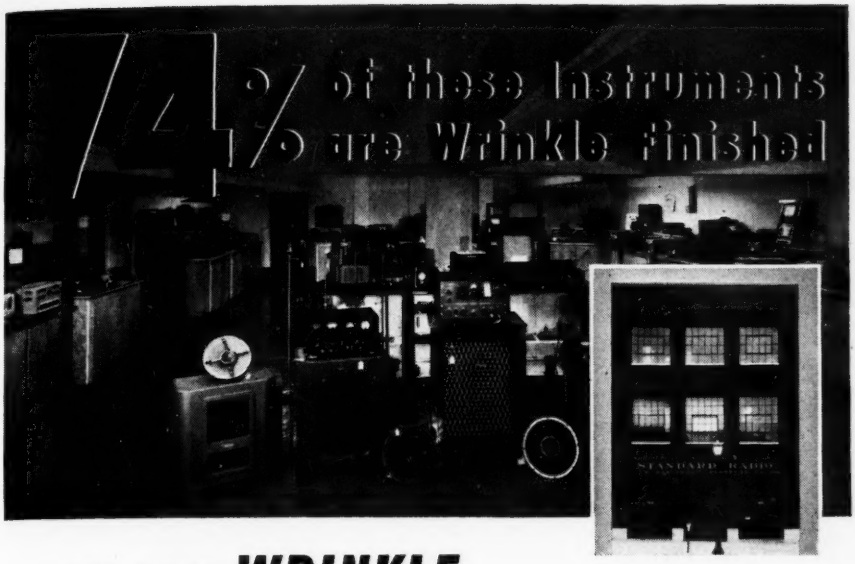
water by brushes attached to hoses and having water run through them, after which they are rinsed in hot water under a horseshoe hot water halo spray, this being followed by a hand-operated compressed air blow-off. They then pass through a Chrysler-engineered electric induction heater, as shown in Fig. 3, where a moderate temperature rise is effected for rapid dry-off. Constants on this heater are 440 volts at 360 cycles, amperage varying with the particular type of work passing through.

Transferred to double lines for final undercoat repair and subsequent finish enamel spray, bodies are now given code numbers identifying the colors which they will receive. There are 25 colors in all, and all are piped under pressure and continuous flow to and from the color booths. Initial operations on these lines include the spot-puttying and spot-sanding of random small defects, hand blow-off and "gas-off" operations, vacuum cleaning of body tops and tack-ragging of main body areas. Bodies then enter the finish enamel booths.

The finish enamel booths, comprising 3 pairs of criss-cross, water-washed units, constitute a gigantic single plenum chamber, whose light, positive air pressure effectually keeps out all dust. In the first pair, door jambs, dash fronts and wheel housings receive their color coats. The second pair of booths, one of which is shown in Fig. 4, is used for the first coat of finish enamel on the entire remaining outside surfaces of bodies, including tops; the third pair of booths for the second color coat. The 2 parallel lines of bodies then enter Burdett bake ovens 190 ft. in length, the bodies passing through the ovens in 20 minutes at a maximum temperature of 265 degrees Fahrenheit.

After emerging from the bake ovens, bodies ascend by escolator to the 8th floor. On arrival, they are subjected to a rigid final paint inspection,

Fig. 6—Filing and polishing operations being performed on passenger car hoods prior to painting in Chrysler Corporation's sheet metal building



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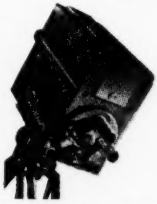

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Fig. 7—Wet sanding operations being performed on passenger car hoods in Chrysler Corporation's sheet metal building

those passing inspection going on for subjection to weatherstripping and ding removing operations, after which they are sent to the 1st floor trim department. Any rejects remain temporarily on the 8th floor, where they are transferred on 2 lines to the paint repair department. Here, those defects which caused rejection are water sanded by hand with 320 grit paper followed by hand-operated compressed air blow-off, gas-off and tack-ragging. An additional coat of finish enamel is now sprayed on in booths identical in all respects with those comprising the 7th floor plenum chamber. Paint spraying is followed by baking in 2 parallel ovens for the same length of time and at the same temperature as on the 7th floor. The paint repair department is also designed for use in two-toning operations during which lowers may be masked off while uppers are sprayed.

The final paint doll-up line, located on the 1st floor, is intended to take care of unavoidable accidents such as trim scratches, and so on. This line is completely equipped to include water sanding, tack-ragging, one pair of criss-cross water-washed spray booths and one bake oven. Bodies are then scheduled for shipment across the street (Jefferson Avenue) to the Jefferson plant or by truck to the DeSoto plant on Wyoming Avenue.

A word about scheduling. As bodies are completed at Chrysler Corporation's Kercheval plant, all pertinent information is teletyped to the Jefferson and Wyoming plants, giving the model style of body, code number of color enamel and type of trim, plus additional miscellaneous information, all of which enables engineers at these plants to have the proper sheet metal parts correctly scheduled to meet the body shell at the proper time and place

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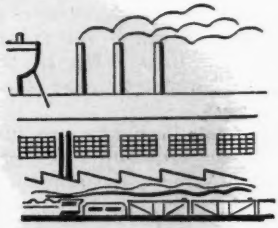

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Stampings for fenders and hoods are made at the DeSoto plant and are kept in reserve banks or stockpiles from which they are removed as needed. After scheduling, various welding and mechanical finishing operations are performed as required. Parts are conveyed by monorail to welding fixtures for spot-welding of brackets, extensions, and so on, all seams being gas welded. Hand filing, grinding, and so on, as illustrated in Figs. 5 and 6, provide for the removal of such miscellaneous imperfections as die marks, after which dings and dimples are removed. After these operations have been performed, the fenders pass onto temporary storage and from there to the finish lines. Up to this point, hoods are handled in the same manner as fenders.

At least 17 colors are involved in the finish scheduling of fenders and hoods. After color scheduling, parts pass on a monorail through the following phosphate coating stages:

1. Hot alkali wash.
2. Hot water rinse.
3. Hot water rinse.
4. Phosphate coat.
5. Cold water rinse.
6. Chromic acid rinse 2 per cent.
7. Automatic compressed air blow-off.
8. Passage through a Burdett oven at 350 degrees Fahrenheit.

All of these stages together are engineered to require 15 minutes total time.

After phosphatizing, parts are transferred to the sealer coat line, where they are tack-ragged before entering a booth. Once in this booth they are sprayed all over with neutral type sealer specially prepared for flowing, the operations being fully automatic. After this spraying, parts drip on the moving conveyor for 25 minutes, this and all previous operations being conducted on all sheet metal. Hoods are sent through the sealer lines twice, for

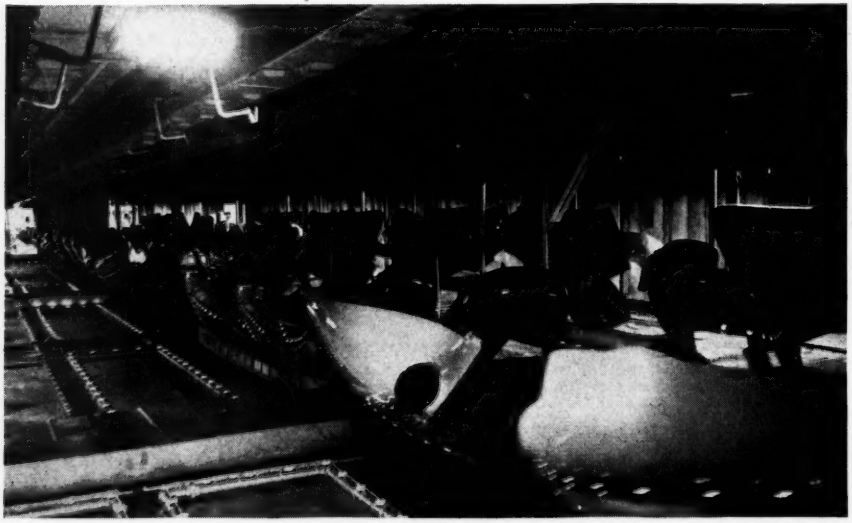

Fig. 8—Final drying oven used in Chrysler Corporation's sheet metal building for baking finish enamel coating on fenders and hoods. Oven is of the gas-fired infra-red type, 140 feet long x 50 feet wide x 10 feet high, and is maintained at a temperature of 250 to 260 deg. Fahrenheit.

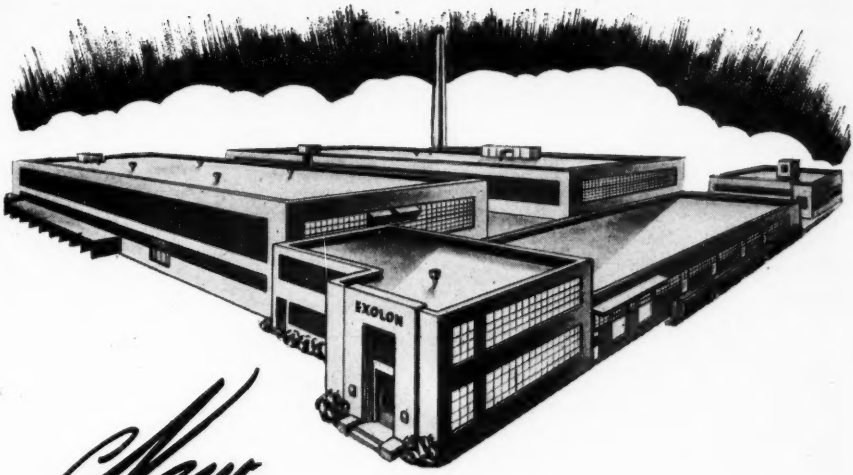

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Fig. 9—Chrysler Corporation's production setup for brass plating aluminum alloy pistons

a total of 2 coats, then water sanded as shown in Fig. 7, using 320 grit paper. They are then returned to the original line and in company with the other sheet metal parts enter a bake oven. This oven is maintained at 320 degrees F., passage taking 25 minutes. Transfer is then made to the color line monorail.

On the color line, all sheet metal parts are first dry sanded by hand with No. 280 grit sandpaper. This is followed by tack-ragging, and then by finish enamel spraying. Color spraying is done on the outer surfaces in a single, large water-washed spray booth by 6 operators arranged in series. Each operator sprays every other piece, so that all parts receive 3 coats. Parts then pass for 22 minutes through a bake oven at 260 degrees F. (see Fig. 8), after which they are inspected for paint. Those passing inspection are conveyed onto assembly. Rejected parts are returned to the beginning of the color line, dry sanded, and passed through the same system for repainting. All air in the spray area is washed, filtered, brought up to 80 degrees F. and maintained at this temperature thermostatically.

In the midst of installing additional up-to-the-minute plating equipment, considerable rust-proofing and brass, copper, cadmium, zinc and hard chromium plating operations are performed. Rust-proofing is done on various small motor, chassis and body parts. All lock washers are rust-proofed as well as underchassis washers, bolts, nuts, and so on. Cadmium plating is confined to small parts such as bolts, nuts, brackets and rods, which is also true of zinc plating. The choice between cadmium and zinc is determined entirely by specifications and is inevitably cadmium in the case of electrical connections, since zinc would corrode on electrical contacts.

Copper is plated for bearing surfaces and as a stop-off prior to heat treating on camshafts, gears and small parts for marine motors. A large number of camshafts and such marine engine parts as clutch plates, disc plates and cast iron pistons are prepared for long wear.

Hard chromium is plated on all tool and plug gages for long life, as well as on all undersized tools for building up to size.

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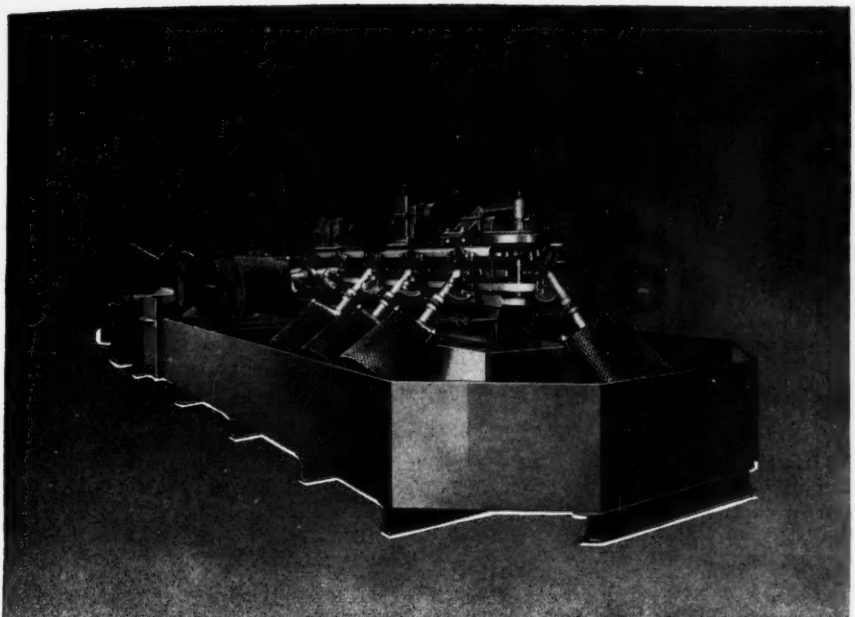

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generator room houses 2 large generators in addition to one which is of unusually large design.

Production brass plating is done on aluminum alloy pistons as an anti-score process, superseding immersion tin plating. When the war made tin plating next to impossible, anodizing was tried as a substitute, but the resultant coat proved too hard. Brass, however, turned out to be excellent and has been used ever since. The brass coating acts as a metallic lubricant, preventing the occurrence of cold weld and effectually eliminating all scoring and scuffing which might otherwise occur during the initial break-in period.

Originally a development of Chrysler research, brass plating at the Jefferson plant is an immersion process, the bath employed possessing the following characteristics:

Copper cyanide	2	oz./gal.
Free sodium cyanide ...	1.25	oz./gal.
Sodium zincate	32	oz./gal.
Sodium hydroxide	16	oz./gal.
Lead .....small amount as catalyst		
Lead carbonate .....1.5 lb./1200 gal.		

Pistons to be brass plated are racked, as shown in Fig. 9, and then passed through a cleaner tank containing a 4 oz./gal. concentration of an inhibited alkali cleaner. The temperature of this cleaner is maintained between 180 and 200 degrees F. with continuous operation of a circulating pump. Parts are then passed through a cold water rinse tank, the fundamental specification for which is that sufficient water be kept running to prevent alkali build-up. The next step is a dip in nitric acid of approximately 50 per cent concentration by volume of concentrated acid. A cold water rinse follows the acid dip, with sufficient water running to prevent acid build-

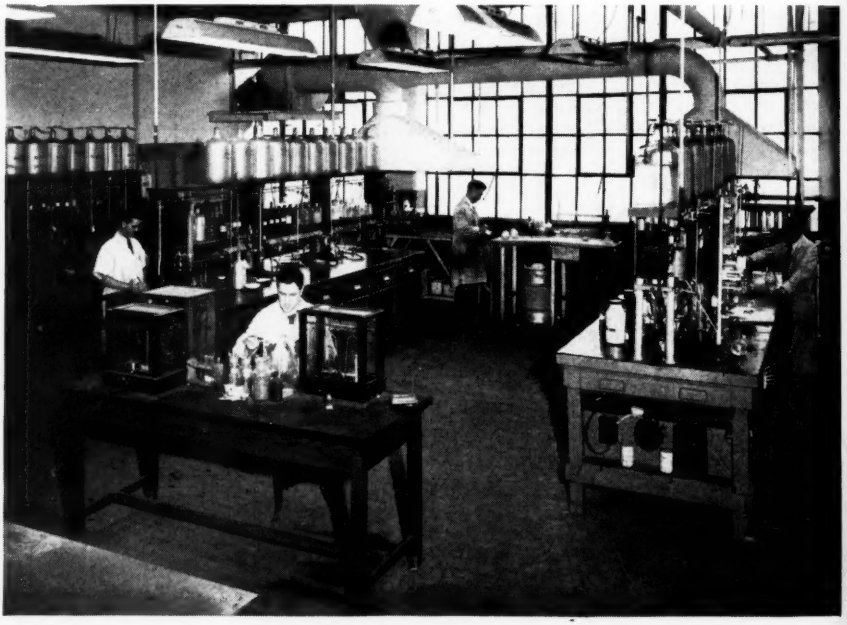
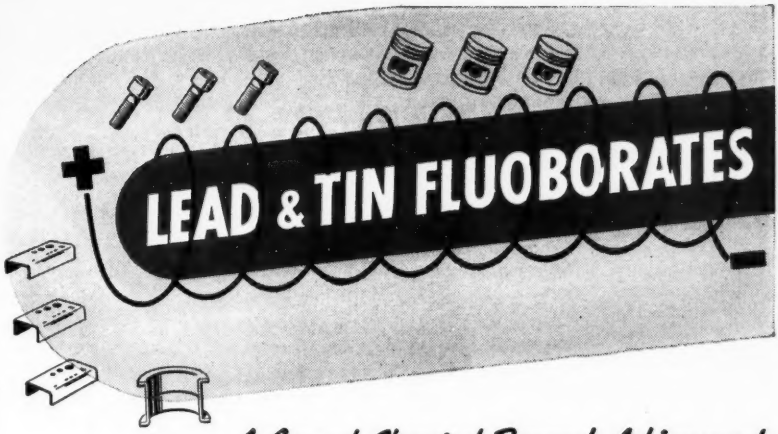


Fig. 10—General view of chemistry laboratory in Chrysler Corporation's Jefferson plant



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up. Parts then enter the plating tank.

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Fig. 10 shows a general view of the chemistry laboratory in Chrysler Corporation's Jefferson plant.

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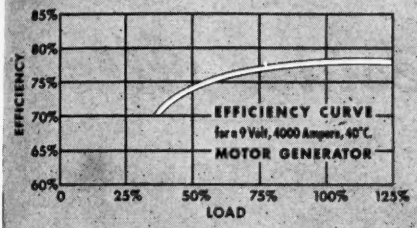
ELECTROPLATING FUNDAMENTALS— how operating efficiency affects plating costs



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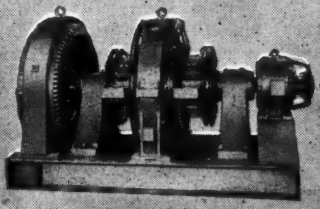

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EP X-22

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Acid Dichromate Treatment for Magnesium Alloys

By GEORGE BLACK

IF the lightweight of magnesium is the silver lining, then the cloud that goes with it is its susceptibility to corrosive elements. Although it has been shown that under ordinary inland atmospheric conditions the magnesium alloys offer satisfactory resistance, their rapid corrosion rate in sea coast areas is well known. Unless the environment is completely controllable, it is advisable to protect magnesium by incorporating a series of surface treatments in conjunction with a painting system which is specifically designed to withstand exposure.

One of the most efficient of the many surface treatments designed to prevent electrolytic as well as atmospheric corrosion of the alloys of magnesium is the acid dichromate treatment, which conforms to the requirements of commercial and governmental specifications in the table below.

The acid dichromate treatment has excellent protective value and is suitable for all wrought and cast alloys with the exception of those high in manganese. Although the coating is relatively soft and should therefore be primed immediately after application to ensure maximum protection, its dielectric value retards electrolytic corrosion, and its suitability as a paint base has been found to make possible excellent protection from corrosive elements in the atmosphere.

The time of the treatment, the condition of the solution, and the composition of the treated alloy will all affect the final color, but, in general, the applied coating will vary from brown to black. Inserts or attached parts of brass, bronze, cadmium, or steel do not affect the coating and are not attacked during the processing. Although it is true that aluminum is rapidly attacked in the hydrofluoric acid dip, the substitution of a 5 per cent acid fluoride bath as outlined below will eliminate this drawback.

One of the outstanding reasons for the popularity of the acid dichromate treatment is its suitability for use on machined surfaces. No dimensional change is effected by this process,

AMC G	American Magnesium Corporation
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98-20010-B	U. S. Army Specification
M-407, Amend 1	U. S. Navy Aero. Specification
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which can be used on rough cast shapes or on the finest of machined surfaces with equal assurance, thus permitting the treatment of cast and wrought alloy in the same tank.

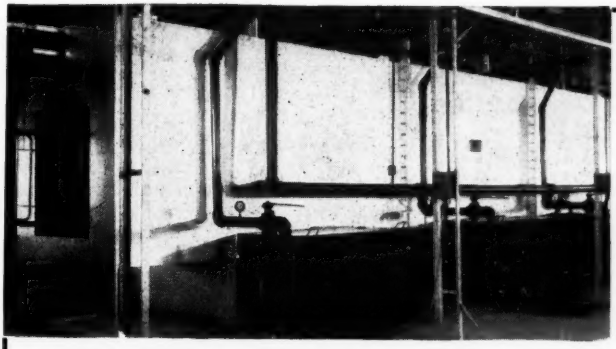
The treatment is designed for application on precleaned surfaces, although the chrome-pickle, which is used on magnesium alloys to protect them during storage and handling, does not have to be removed, as it has no effect on the results obtained. After the preliminary cleaning operations which remove all grease, oil, welding flux, old paint, and so on, the parts should be thoroughly cleaned in a strong alkali cleaner, similar to the type used for the cleaning of steel parts prior to electroplating. The following formula will also provide an efficient cleaner:

Sodium carbonate ___3 oz./gal.
Sodium hydroxide ___2 oz./gal.
Soap _____1 oz./gal.

The solution should be used boiling hot and, after treatment, the parts should be given a thorough washing in cold running water.

Immediately after final cleaning has been completed, the parts should be immersed for 5 to 10 minutes at room temperature in a 15 to 20 per cent by weight solution of hydrofluoric acid (HF). Lead or lead-lined tanks are suitable containers for the hydrofluoric acid solution, although steel tanks lined with acid-resistant rubber compounds have also been found satisfactory.

In lieu of the hydrofluoric acid, a 5 per cent solution of sodium acid fluoride ($NaHF_2$), potassium acid fluoride (KHF_2), ammonium acid fluoride (NH_4HF_2), or other suitable acid fluoride mixtures may be used. The recommended treatment time is 15 minutes at room temperature. Although these acid salt treatments permit the processing of magnesium alloys with aluminum attachments,



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their main drawback is that they may not be used on parts which have been previously surfaced by sandblasting.

After removal from the hydrofluoric acid or acid fluoride solution, the parts should be thoroughly rinsed with cold water and then boiled for approximately 45 minutes in a solution containing 10-15 per cent by weight of sodium dichromate ($Na_2Cr_2O_7 . 2H_2O$). The sodium dichromate solution can be held in iron, aluminum, magnesium, wood, or most any of the commonly used tank materials. The treatment should be followed immediately by thorough rinsing in cold water and a hot water dip to facilitate drying.

Solution Preparation and Maintenance

A satisfactory hydrofluoric acid solution can be prepared by diluting one volume of technical grade (48-52 per cent) hydrofluoric acid with two volumes of water. This solution is depleted very slowly in use. It should not be allowed to go below 10 per cent or above 20 per cent HF as determined by a titration for free acid with normal sodium hydroxide (NaOH) and phenolphthalein indicator. Hydrofluoric acid should be added as needed to maintain the titration between 10 and 20 ml. of 1.0 N sodium hydroxide per 2 ml. of sample. This corresponds roughly to 10-20 per cent hydrogen fluoride by weight. It is recommended that a rubber bulb be used for drawing the sample into the pipette and, to avoid error by reaction of the hydrogen fluoride with glass, the sample should be discharged into at least 100 ml. of distilled water in the vessel used for the titration, and the titration should be performed immediately.

In handling hydrofluoric acid, great care should be exercised to avoid contact with the skin so as to eliminate burns. Any accidental contact should be followed immediately by thorough and prolonged washing in water. Inhalation of the acid fumes should also be avoided at all times.

The aqueous solution of sodium dichromate can be readily prepared by dissolving ¾ pound of technical sodium dichromate per gallon of water. This is equivalent to from 10-15 per cent $Na_2Cr_2O_7 . 2H_2O$ by weight. Depletion of the solution will be evidenced by non-uniformity of coating or by increase in the time required to obtain a uniform coating. The pH of a depleted solution is approximately 6.2. Revivification can be accomplished by adding 0.2 ounce per gallon of flake chromic acid to bring the pH to approximately 4.2. More accurate control can be obtained by maintaining the pH of the solution between 4.2 and 5.5 electrometrically.

The sodium dichromate content should be periodically determined and should be maintained between ¾ and 1¼ pounds per gallon. The analysis for determining the number of pounds of sodium dichromate per gallon of solution is based on the reaction which is given below:

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$$Na_2Cr_2O_7 \cdot 2H_2O + 2Pb(NO_3)_2 \rightarrow 2PbCrO_4 + 2HNO_3 + 2NaNO_3 + H_2O$$

A simple and relatively accurate procedure for determining the weight is to pipette 5 ml. of solution into a 400 ml. beaker containing 300 ml. of water. Titrate with constant stirring with lead nitrate solution (containing 0.1332 gm. $Pb(NO_3)_2$ per ml.) until the yellow precipitate of lead chromate ($PbCrO_4$) ceases to be formed. Toward the end of the titration the precipitate should be allowed to settle and a drop or two of the lead nitrate solution should be added to the clear supernatant liquid where the precipitation of the lead chromate may be readily observed. Should a precipitate form, stir the solution and repeat the settling operation and addition of the lead nitrate until the precipitate ceases to form. Add 0.5 ml. excess lead nitrate solution and then compute as follows:

0.1 multiplied by "A" equals $Na_2Cr_2O_7 : 2H_2O$ in pounds per gallon. ("A" equals the number of ml. of lead nitrate added, minus the 0.5 ml. which was added in excess.)

Control of the quality of the processed material is maintained by visual examination for complete and uniform coverage. Alert solution maintenance in accordance with the methods outlined above plus regular visual inspection of treated material go hand in hand toward making the acid dichromate treatment one of the most easily applied and efficient processes for the protection of magnesium alloy surfaces against corrosion.

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THE finishing engineer should keep in mind the fact that most of the ordinary testing procedures which are in general use today for industrial organic finishes are at the best only essentially approximations of conditions expected to be encountered in actual service. In many cases, the test procedures may be intentionally more severe than the service conditions that will be encountered. There are also a number of tests for which no well worked out correlation between laboratory results and actual service performance is available. Although it is more than possible that certain tests do not correctly measure the properties they are designed to evaluate, they do in most cases provide a relative picture of the actual performance, and, by so doing, provide a valuable yardstick for comparing the merits of the different available materials.

It is generally considered that good laboratory tests, intelligently applied, can usually be depended upon to discriminate between coatings with regard to a given physical property. In addition, by careful interpretation of results of groups of tests, organic coatings can often be ranked in the relative order of their respective general performance. However, as a rule, laboratory tests on physical properties are more valuable from the standpoint of relative data than absolute data, and it is usually unwise to predict the durability or service performance of a finish as an absolute quantity on the basis of laboratory tests. A great deal of reliance must be placed on outdoor exposure

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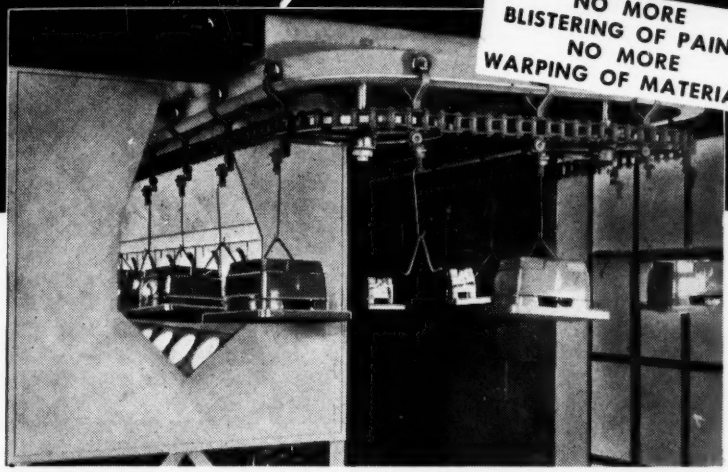

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and service inspections, as well as the use of formulas previously proven to be satisfactory.

One important fact that should be accepted and given due consideration is that organic coating tests should be conducted under conditions as nearly identical with the actual use as possible. This will require that special attention be paid to such factors as: (1) choice of substrate; (2) surface preparation of test panel; (3) method of application of finish and drying procedure employed; and (4) thickness of film used. The finishing engineer in charge of testing should see that these factors are selected to be as close to actual service conditions as possible.

The methods employed in the evaluation of industrial finishes to be used on appliances at the Bridgeport Works Laboratory of The General Electric Company were described before the recent spring technical meeting of the A.S.T.M. in Philadelphia by R. A. Pringle and E. M. Yacko. Panels used for tests at the General Electric Works Laboratory are 4 inches by eight inches and are made from No. 22 gauge steel with a cold rolled satin finish. The panels are left coated with oil to prevent rusting until ready for use, at which time they are cleaned and given a proprietary phosphate treatment prior to applying the organic coating that is to be tested. The phosphate treatment is applied by running the panels through the factory unit in which the appliances are actually treated prior to finishing, following which the panels are thoroughly dried prior to applying the finish under test.

In the General Electric test procedure care is taken not to handle the treated parts with the bare hands prior to the application of the finish. The panels are sprayed with the organic finish on a rack which holds them at an angle of 45 degrees. This provides a truer picture of the ability

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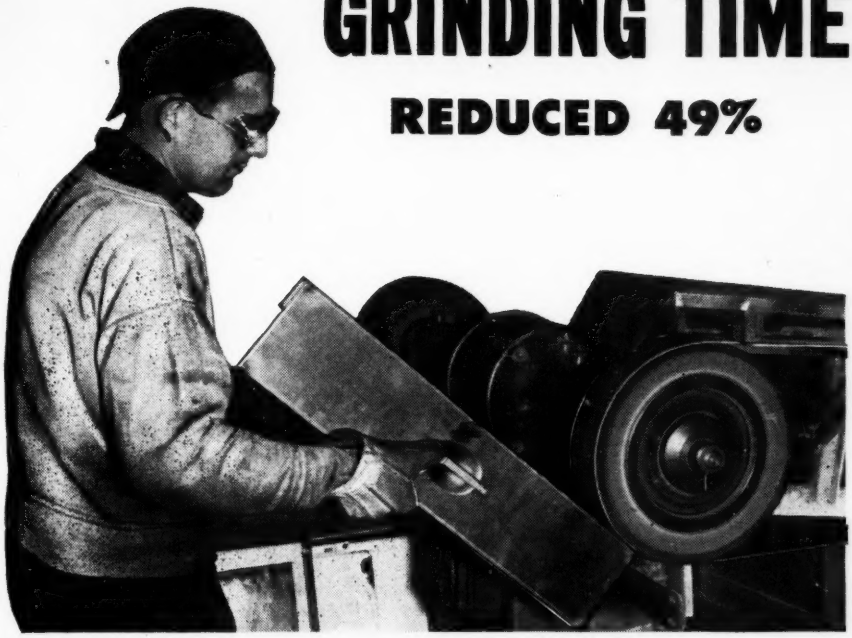

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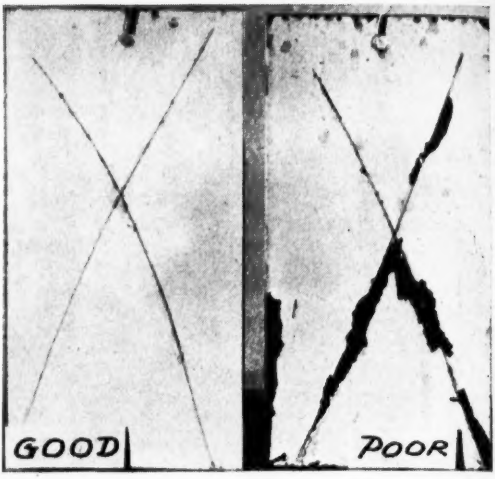

Fig. 1—Typical panels, used to test industrial finishes, after removal from salt spray cabinet (*Photo courtesy General Electric Co.*)

of the film to build without sagging than if the panels were sprayed in a horizontal position. Before baking the panels, the solvents are allowed to flash off for five to 10 minutes. After baking, the coated panels are allowed to age for 48 hours before any tests are made.

Salt Spray Test. According to the procedure described by Pringle and Yacko, to carry out a salt spray test an "X" is scratched in the center of the coated panel, cutting through the coating and exposing the bare metal. The panels are then hung in the salt spray cabinet. The test chamber used is a standard salt spray cabinet meeting A.S.T.M. requirements of a fog of 20 per cent salt solution maintained at a temperature of 90 to 95 deg. F. The panels are left in the salt spray cabinet for 200 hours and examined daily during the period for signs of deterioration. At the end of this 200-hour period, the panels are removed, washed, dried and rated. The rating is made on the basis of ten being perfect. As a general rule, failure in salt spray usually shows up in the form of corrosion creepage back from the scratch in the panel and from the edges of the panel, as is illustrated in Fig. 1. Grading is done by subtracting one point from the ten for each one-sixteenth of an inch creepage. Usually not more than one-sixteenth of an inch creepage is allowed.

Humidity Test. The panels for humidity tests are prepared in much the same manner and hung in a humidity cabinet, consisting of a heated room thermostatically con-

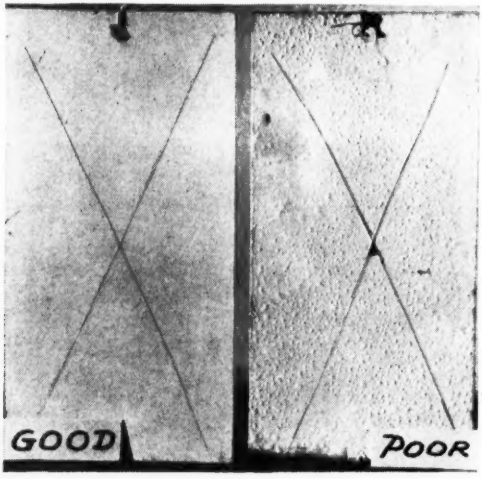

Fig. 2—Panels after removal from humidity test cabinet (*Photo courtesy General Electric Co.*)

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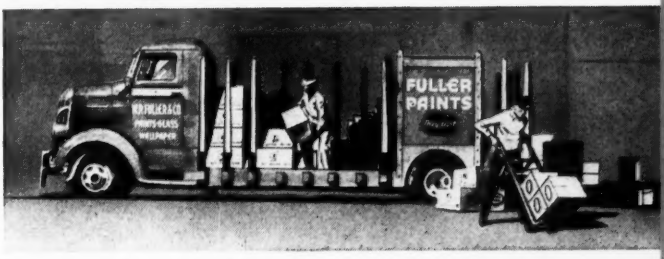

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trolled to maintain a temperature of 90 to 95 deg. F. and a relative humidity of 100 per cent. According to Pringle and Yacko, a satisfactory finish should show no signs of failure after 48 hours and only a very slight blistering of the scratch after 200 hours. Figure 2 illustrates the appearance of satisfactory and unsatisfactory panels exposed in the humidity cabinet.

Alkali Resistance Test. This test is conducted at General Electric on finishes which are to be exposed to soap or other alkaline conditions. The panels are hung so that one-half is immersed in a test solution consisting of a 1½ per cent solution of "Gold Dust" maintained at 165 deg. F. Tests are carried out for 100 hours and the panels are required to withstand at least 48 hours of this exposure without being affected.

Color Retention. After normal aging of the test panels for 48 hours to allow for normal bleaching, the panels are exposed to the ultraviolet rays of an Atlas Weather-O-Meter. Half of each panel is shielded from the untraviolet rays with aluminum foil so that the original and final color may be compared at the end of the 200 hours' exposure. At the end of this time it is required that the finish must not have dulled or noticeably discolored.

Abrasion Resistance. According to the General Electric test procedure, abrasion resistance tests are carried out on coated panels using a standard Taber Abraser, the wearing action being obtained from Dual Calibrase wheels of definite abrasive properties. Panels are weighed, run for 500 cycles, and reweighed, the procedure being repeated until the coating has been worn off to the base metal. The abrasion resistance factor is determined by averaging the weight loss and then reporting it as milligrams loss per 1,000 revolutions.

Flexibility Test. This test is conducted to afford an indication of the ability of the coating to stretch without separation from the base metal. A mechanism is provided to bend the test panel closely around a conical mandrel. (Such an instrument is manufactured by Henry Zuhr in New York City.) The device provides a varied elongation of the film ranging from 23 per cent around the small radius to 2.2 per cent around the large radius when the finish has been applied on a regular No. 22 gauge stock test panel. The distance of chipping and cracking back from the small diameter of the bent panel is noted. According to the rating employed at Pringle and Yacko at the General Electric Test Laboratory, using a four-inch wide panel and based on a rating of ten being perfect, one point is deducted for each four-tenths of an inch of chipping and one-half a point for each four-tenths of an inch of cracking. A good cabinet enamel should take a bend on the mandrel and show no cracking or chipping.

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Hardness Test. For an indication of the hardness of a finish, the Sward Hardness Rocker may be used. The rocker is adjusted to provide 50 oscillations on polished plate glass. Multiplying this figure by two gives 100 which is the value of the plate glass as a reference standard. Based on this standard a minimum hardness of 20 is required for an appliance finish.

Impact Resistance Test. For this test, Pringle and Yacko reported that General Electric uses an instrument of its own construction built to meet the requirements of the Kitchen Cabinet Institute. The instrument consists of a two-pound steel rod with a ½-inch diameter spherical contact end. This bar is allowed to fall ten inches onto the test panel which has been placed on the base of the instrument. The base comprises a heavy steel block with a ⅝-inch diameter hole centered directly under the free falling impact rod. Thus, the panel is subjected to an impact of 20 inch-pounds. Requirements for a kitchen cabinet finish permit no chipping or flaking when either side of the panel is subjected to the impact test. On other finishes where outstanding heat or alkali resistance is of prime importance some chipping is allowed.

Stain Tests. According to the General Electric test system, any finish which is to be used on a kitchen appliance must be able to withstand fruit acids and greases without staining or softening. The stain test is carried out by applying a small amount of the following staining materials to a standard aged panel: (1) lemon juice; (2) tomato juice; (3) grape juice; (4) butter; (5) Crisco; (6) bacon fat; and (7) mayonnaise. The panel is then placed in a horizontal position in an oven maintained at a temperature of 100 deg. F. for 24 hours. The panel is removed, washed, dried, and examined for staining or softening. A satisfactory finish is required not to have soft-

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ened or to show more than a slightly visible stain after this exposure.

Heat Test. This test is conducted in the General Electric Laboratory on finishes which are to be used on such appliances as electric roasters. It is carried out by placing the standard test panel in an oven operated at 300 deg. F. and allowing the panel to remain for 300 hours. The finish is checked periodically for dulling, discoloration, embrittlement, loss of gloss, and loss of flexibility and adhesion.

Adhesion Test. This test is made on an aged panel by scratching the film with the point of a knife and noting the ease with which the finish comes free from the base metal. The fingernail is then used to chip the finish loose from the sides of the scratch.

According to Pringle and Yacko, when a sample finish has been subjected to these various tests and rated, the ratings are weighed, depending on the end use. For example, alkali resistance is of prime importance in a washing machine finish, whereas heat resistance is of more importance on a roaster. Thus, from the total of these weighed rates, an overall evaluation of the finish is obtained, and the finish having the highest evaluation of those tested for a particular use is the one that is approved for plant use.

* * *

Passivating Treatments May Improve Cadmium Plate Coatings

ONE fact which all finishing men may not be aware of is that chromate passivation may improve the serviceability of cadmium plated coatings, for certain uses, out of all proportion to the effort and cost in its application. One of the shortcomings generally recognized in zinc coatings is their tendency to form white corrosion products, and this deterioration can be greatly retarded by passivation in aqueous chromate solutions of which several compositions are used in the industry. Cadmium coatings are generally more dense than zinc coatings at a given thickness but under certain conditions they may fail in much the same way particularly under conditions of high humidity. In many cases, the same passivating treatment can be applied to electroplated coatings of cadmium as to those of zinc, and, often times, it has reportedly been found that the added protec-

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tion afforded by the chromate treatment is even greater than that found with zinc. One passivating composition that has been recommended consists of a solution of 150 to 200 grams per liter of sodium dichromate to which has been added 5 to 10 ml./l. of concentrated sulfuric acid (see also "Metallurgia," October 1946). The work should be passed directly from

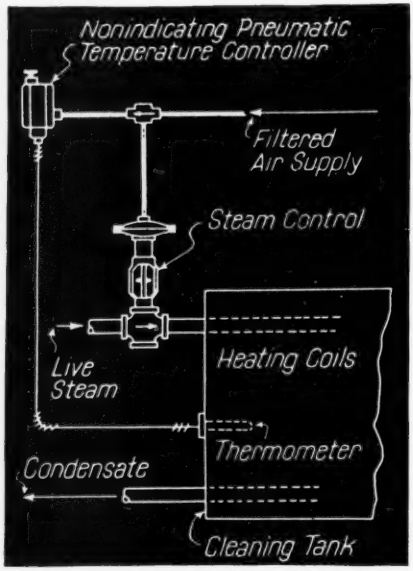

Fig. 3—Diagram of temperature control device for cleaning bath (*Illustration courtesy "Metal Progress"*)

the plating bath into the chromate treating solution, and the time of immersion should be controlled. It is also reported that overheating should be avoided in drying the work since hot water may leach inhibitive compounds from the passive film, while hot baking may drive out combined moisture, both of which may depreciate the value of the film.

Cadmium, like zinc, is a sacrificial protection for iron and steel. It is the preferred finish for steel parts in many industries requiring a large number of assembly operations, such as the radio industry. Zinc plating is also widely used in these applications. In many industries, the assembly of a variety of components may lead to numerous bimetallic junctions which tend to promote corrosion due to local cells being set up under damp conditions. This risk is considerably minimized by reducing the electrochemical dissimilarity at the junctions by electroplating. Thus, in some instances, it may be desirable to cadmium plate copper and other non-ferrous alloys that are to be assembled to cadmium plated steel. For intricate parts of assemblies subjected to unusually corrosive conditions, particularly exposures to high humidity, the finishing engineer should look into the several types of commercially available chromate treatments available for cadmium plate for added assurance that the finish provided will function satisfactorily in the service for which it is required.

* * *

Temperature Control of Alkaline Cleaning Baths

THE proper control of temperature of alkaline cleaning baths is important to ensure operation at maximum efficiency without waste of fuel. One system that has been recommended by M. G. Herbach of the Philadelphia Rustproof Company and C. W. Bowen, Jr., of the Brown Instrument Company comprises a remote bulb, air-operated, non-indicating temperature controller with a range of 100 to 220 deg. F.; a steel well for the bulb; and a low lift, V-ported diaphragm, steam valve with a bronze body and trim (see also "Metal Progress," Feb. 1947). A diagram of such a temperature control system for cleaning tanks is shown in Fig. 3.

The location of the thermometer bulb in the temperature control system must be given careful considera-

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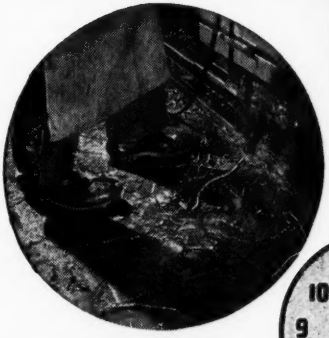

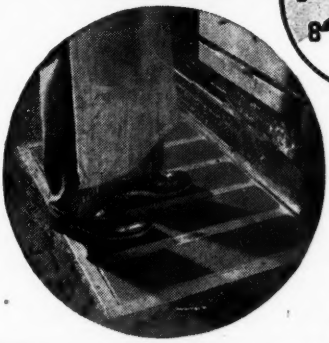

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tion. The bulb should be placed where a representative temperature exists, which means that it must be sufficiently remote from the source of heat. In an electrolytic cleaning tank, the bulb must be away from the path of current flow, to prevent corrosion of the well. As a general rule, the best location is at the end of tank rather than at the side. The finishing engineer in charge of the cleaning system will find that economies resulting from the installation of accurate temperature controls will readily justify the installation of such equipment.

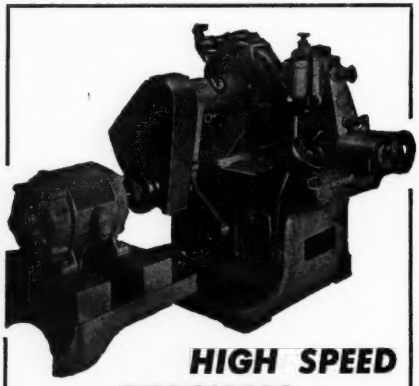
* * *

Reducing Hydrogen Embrittlement in Electroplating

THE embrittlement of steel springs by hydrogen released from the plating bath during plating is a phenomenon which may cause metal failure at far below service stresses, and is a factor of great concern to finishing departments engaged in the plating of many different types of spring-like objects. According to C. T. Eakin and H. W. Lownie, Jr., a commercial heat treatment of 2½ hours at 527 deg. F. has been found to be effective in the relief of hydrogen embrittlement in various types of electroplated steel springs. It has been reported that six years of successful application has verified this practice for general use (see "The Iron Age," Nov. 21, 1946).

Some hydrogen gas is evolved at the cathode during the electroplating of many different metals. The visual evolution of this hydrogen is referred to as gassing. With any given type of plating bath, the amount of gassing is a variable, depending upon a number of factors, some of which are subject to control. Baths that are operated with a high cathode current efficiency indicate the occurrence of little or no gassing, while low current efficiencies indicate considerable gassing. The work carried out by Eakin and Lownie showed that plating baths that are operated with severe gasses also result in increased embrittlement. In addition, the degree of embrittlement reached was more marked on the harder materials. Moreover, it was found that springs of low hardness were relieved of hydrogen embrittlement with comparative ease, while springs of higher hardness required treatment at higher temperatures for longer periods of time.

Recommended treatment for complete embrittlement relief for cadmium plated springs involves heating for 2 to 3 hours at a temperature of 527 deg. F. According to Eakin and Lownie, complete relief may sometimes be attained in as little as one-hour treatment time; the increased time is advisable to allow for variables in production operations, including a somewhat longer time for springs of thicker sections. In all cases where cadmium plated springs were relieved



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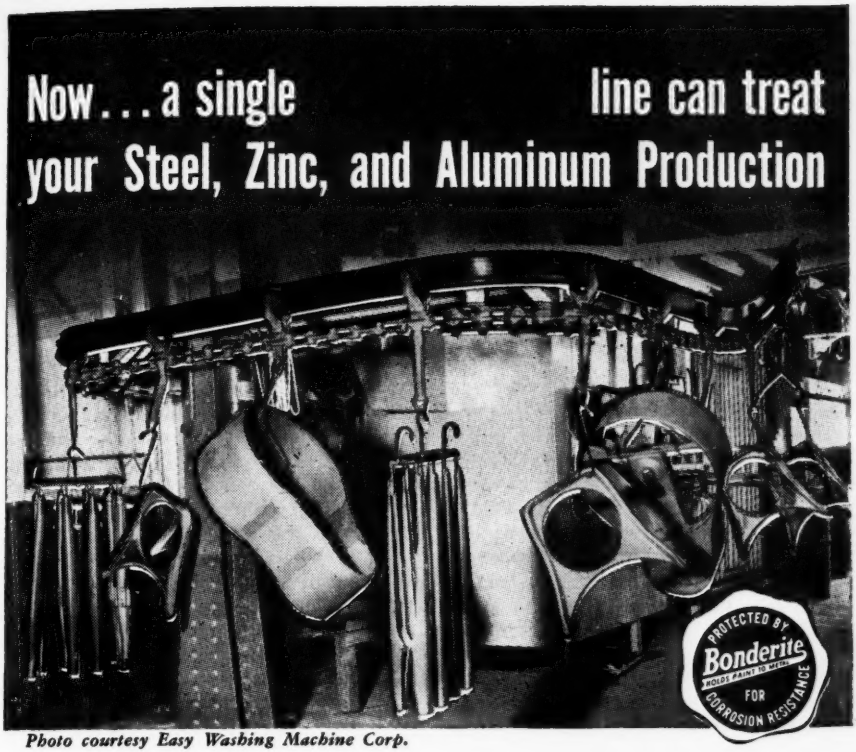

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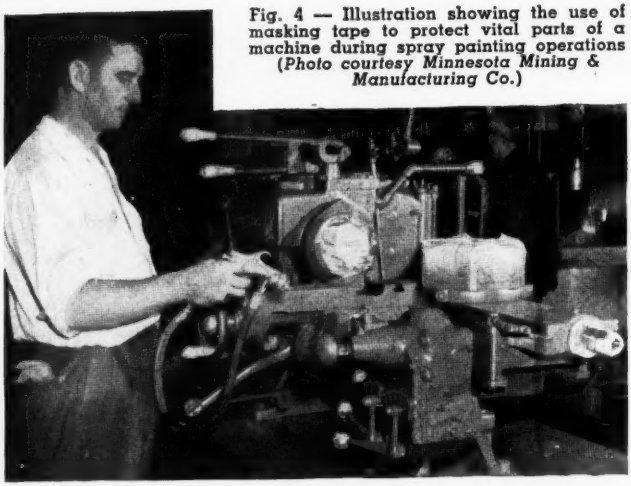


Fig. 4 — Illustration showing the use of masking tape to protect vital parts of a machine during spray painting operations (*Photo courtesy Minnesota Mining & Manufacturing Co.*)

at a temperature of 527 deg. F. the appearance of the plate was found to be acceptable. The high elastic properties necessary for steel springs are imparted to the steel by thermal treatment, such as quenching and tempering or by cold-working thermal treatment. Thus, treatment of electroplated steel springs at the temperature required for the relief of embrittlement was found not to impair the original properties of these materials.

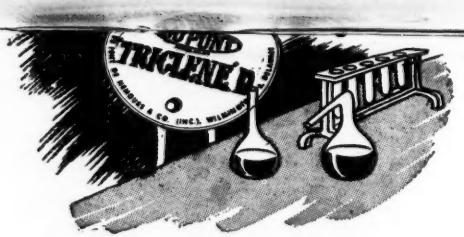
In the treatment of other types of electroplates on steel springs, it was found advisable to treat copper plated steel springs at lower temperatures to avoid loss of copper due to surface oxidation. For steel of 47 Rc, complete relief was obtained by 16 hours treatment at 300 deg. F. For copper plated steel springs, which were somewhat harder, such as 57 Rc, treatment at somewhat higher temperatures was recommended in order to reduce the time required to a value that would be commercially feasible. Eakin and Lownie found that there was some tendency for the zinc plate to blister if placed in an oven operated at 527 deg. F. It was found that this condition could be effectively remedied by heating the plate at a slightly lower temperature for a longer period of time.

In commercial operations, it is sometimes necessary to remove electroplated coatings from steel springs. While complete removal of the plated coating can be obtained with dilute acids, this procedure gives rise to severe hydrogen embrittlement of the steel, and should never be used for the deplating of steel springs. Eakin and Lownie recommend the use of a solution of ammonium nitrate for the removal of cadmium plate from steel springs without producing hydrogen embrittlement of the steel base.

* * *

Proper Use of Masking Tapes May Facilitate Many Finishing Operations

THE term "masking" when used in describing modern finishing room techniques has come to cover an extremely wide range of varied operations. Masking designs and insignia for spray painting on airplanes, trains, trucks, and so on, is of course, very commonly used. It is important that the finishing engineer keep in mind that the most modern and probably the most versatile method of masking is by the use of paper and cloth tapes backed with a pressure sensitive adhesive. Present-day uses of masking tapes include striping and color separation on a wide variety of products, from large units such as passenger automobiles and motor trucks to the smallest cabinets and miscellaneous



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parts during production painting operations. Such practice enables the production department to take full advantage of the speed and economy of spray painting. In the finishing of machine tools, the proper masking tapes may be used to protect bright metal parts during spray painting, as shown in Fig. 4.

Present-day commercial masking tapes are available in practically any width required. The smaller widths will be found of most value in following curved lines, particularly an irregularly curved surface. The tape is applied by simply pressing in place along the outlines to be followed, care being taken along the line of separation to prevent any tendency of the paint to creep under the tape. Areas which are not immediately adjacent to the lines may be covered with heavy paper which is held in place by the tape. The adhesives used on masking tapes are generally formulated to function best at room temperature and, therefore, should not be applied to extremely hot or cold surfaces.

Modern masking tapes are available that will withstand baking operations. It is important that this requirement be specified in securing masking tapes if they are to be left on during a baking operation. Special types of extra strength masking tapes are available that will protect metals during sandblasting and buffing operations, as illustrated in Fig 5. These types of tapes are sometimes used in sandblasting designs on metal surfaces. For such operations, a tape should be selected which clings firmly to the metal base, resisting any tendency to lift under the force of the blast.

It is good practice to leave one corner of the masking tape loose to facilitate removal. If possible, the tape should be removed immediately after the color coat is applied. This will ensure cleaner, sharper edges. If it is necessary to remove the tape after the paint is dry, removal should be effected by pulling the tape in the direction away from the paint, in order to provide the smoothest edge possible.

* * *

Proper Racking Important in Plating on Aluminum

ELECTROPLATING on aluminum is commercially practical and economically sound. In general, electroplates are applied to aluminum to produce an attractive finish, or one which is more wear resistant. One factor which the electroplater dealing with aluminum should consider carefully is the type of racking used. At first thought, the racking of aluminum objects appears easy. However, because of the lightness of most aluminum objects, loose racking does not permit sufficient pressure of

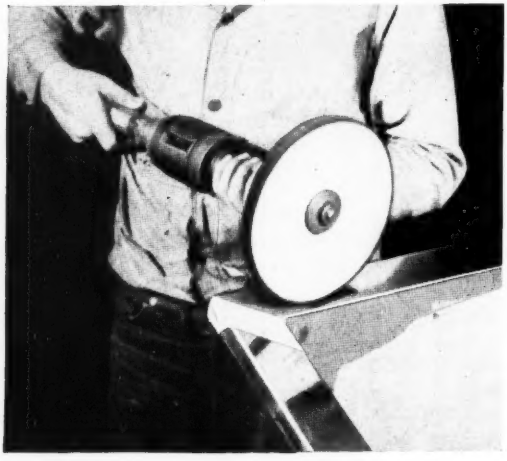


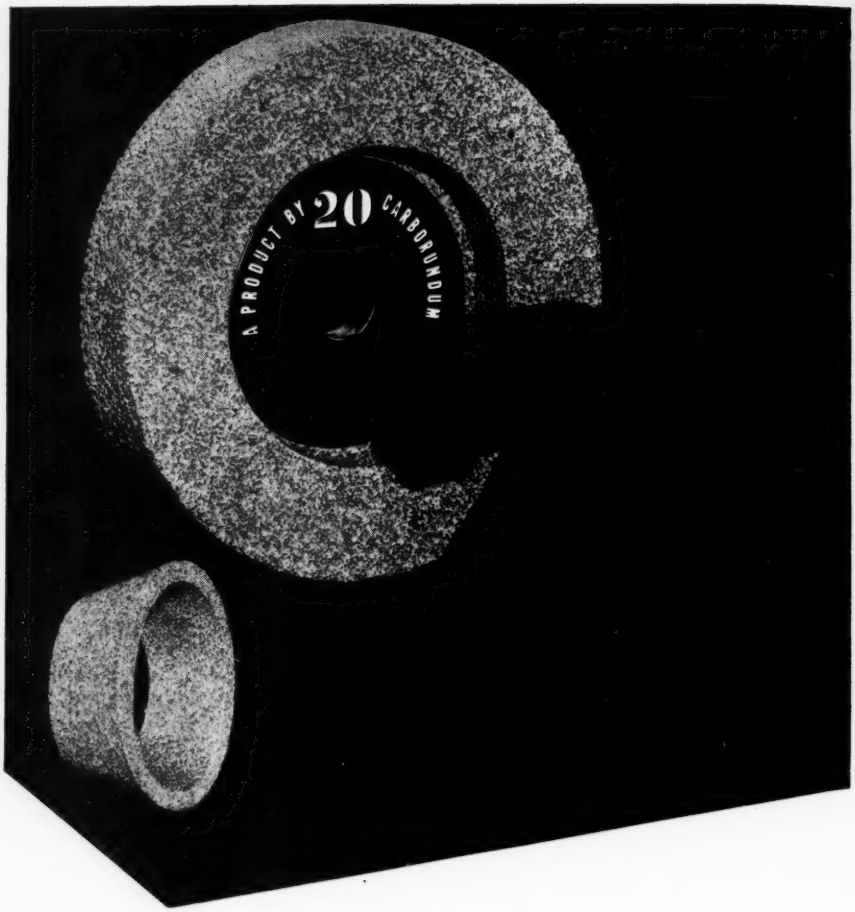
Fig. 5—Masking tape being used to protect diagonal corner line during the buffing of stainless steel *(Photo courtesy Minnesota Mining & Manufacturing Co.)*

Fig. 6—Chromium applied over appropriate undercoats provides a permanent non-tarnishable finish to these aluminum utensils. *(Photo courtesy Aluminum Company of America)*

the work against the hook to provide a firm contact either between the work and work hook or where the hook contacts the bus bar. As a result, thin or imperfect plating may occur. It is very important that tight racking of aluminum be employed to obtain good results. Spring contacts should be used for racking the piece, and the aluminum rack itself should be clamped to or fitted snugly against the bus rod. Many cases of defective work have been noted where the work is simply placed on hooks. In such cases, a portion of the parts may be satisfactory while another portion may be defective, notwithstanding the fact that all parts have undergone the same operations. The difficulty in this case is generally due to poor racking.

According to recommendations of Dr. Walter R. Meyer, racks and contacts used in plating on aluminum should be made of springy aluminum wire such as 17S (see also "The Monthly Review," March 1946). Almost all plated coatings can be stripped from aluminum wire in a 50 per cent by volume solution of nitric acid without harming the aluminum. Racks are frequently made of bronze, brass, or copper. However, in such cases there may be danger of an electrochemical action taking place during pretreatment of the parts to be plated by immersion in the alkaline zincate solution, which will prevent proper formation of the zinc film, especially adjacent to the actual contact points. If the rack contacts the piece on the inside, where the plating will not show, racks made of metals other than aluminum may be satisfactory. However, in such cases the body of the rack should be properly coated.

The "zinc immersion process" referred to above is rapidly approaching the point where it is considered as a generally applicable method for plating on aluminum. In this process, a chemically formed immersion deposit of zinc serves as the bond for subsequently applied electroplates. The most commonly used finish comprises the tarnish-resistant combination of successive deposits of copper, nickel, and chromium, as shown in Fig. 6. Other metals may be applied over the initial copper deposit. Brass and silver may be applied directly over the zinc immersion coating. When properly applied, it is reported by the Aluminum Company of America Laboratories that these electroplates will not blister upon heating and the degree of adherence is as great as the cohesive strength of the base metal. The equipment used in plating upon aluminum by the zinc immersion process is about the same as that used for plating upon other base metals. Several other good procedures are available for plating upon aluminum.



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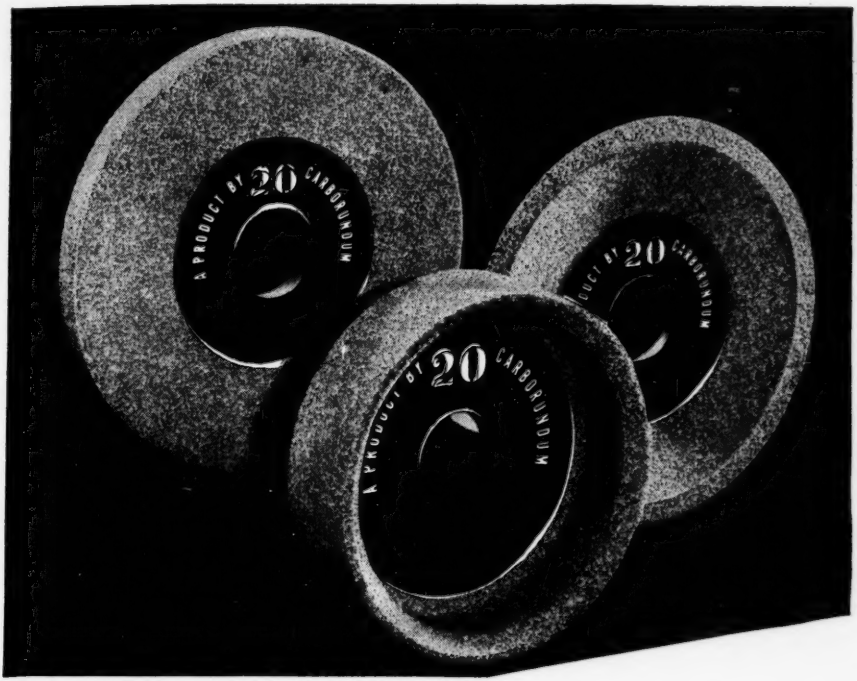

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Barrel Finishing of Metal Products

Part 11—Barrel Finishing As an Intermediate Operation

By H. LEROY BEAVER

Barrel Finishing Consultant
Lansdale, Pennsylvania

FOR the present discussion it will be necessary for us to set a stage involving two scenes. The first scene finds us in a consultation room of a quite large establishment and on the table before us are a number of tiny packets, each of which are nicely wrapped in tissue. The second scene finds us in the Lansdale Post Office and in our box a card typed simply, "Ask for Package." This package, be it large or small, when opened will be found to contain anywhere from six to twelve small packages, each of which is also nicely tissue wrapped and identical to the kind placed before us in the first scene. These two scenes have been repeated so often down through the years that even before any of the packages is unwrapped in either scene, we can, and with safe assurance, in at least between 90 and 100 per cent of the cases provide the answer to the question even before that question is ever asked. The answer is always the same and is just plain "NO." The fact that we have three of these packages before us on our work table right now prompts this discussion at this time.

Well, you will ask, what do we find in these packages wherein history repeats itself so often. Plainly and simply we find hand buffed and colored metal parts, most of them quite beautifully executed and showing workmanship of the highest character, and the question **"Can you duplicate this finish in a burnishing barrel?"** And that question will help a lot of our readers who are familiar with both the operations of cutting and coloring with buffs and compositions, as well as barrel finishing procedure, to understand why our answer is always "NO."

Those who have followed our recommendations down through the years will recall the very many times that we have insisted that barrel finishing procedure and the finishes that are obtained by barrel finishing have their limitations. We still maintain that to be true and so far as our own experiments are concerned we have never been able to obtain finishes from barrels fully comparable to those obtained by individual handling with buffs and compositions. We are perfectly content to place ourselves in the position of saying that while maybe it can be done we have personally never been able to accomplish it. It's simply a case

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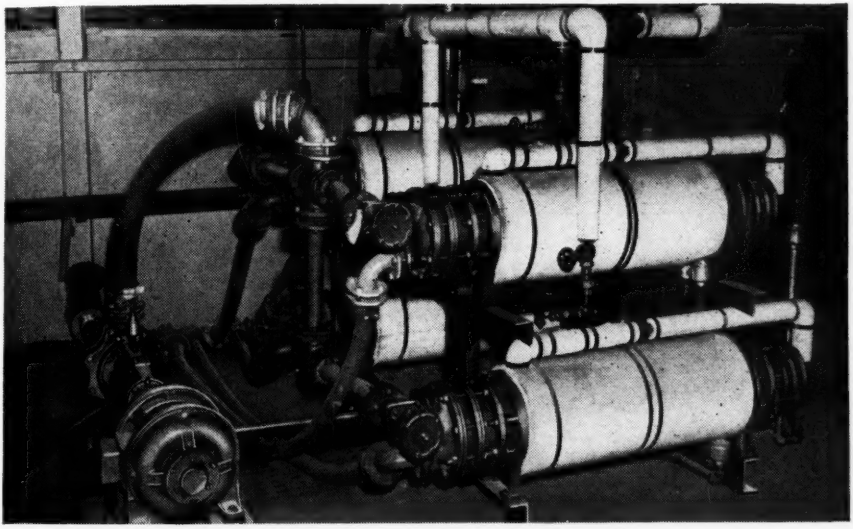

The four units pictured here are on a 10,000 gallon 9-H bright nickel installation. Operating at 75 lb. steam pressure, they maintain the solution at exactly 150° F. and plate 1.5/1000" nickel in 35 minutes.

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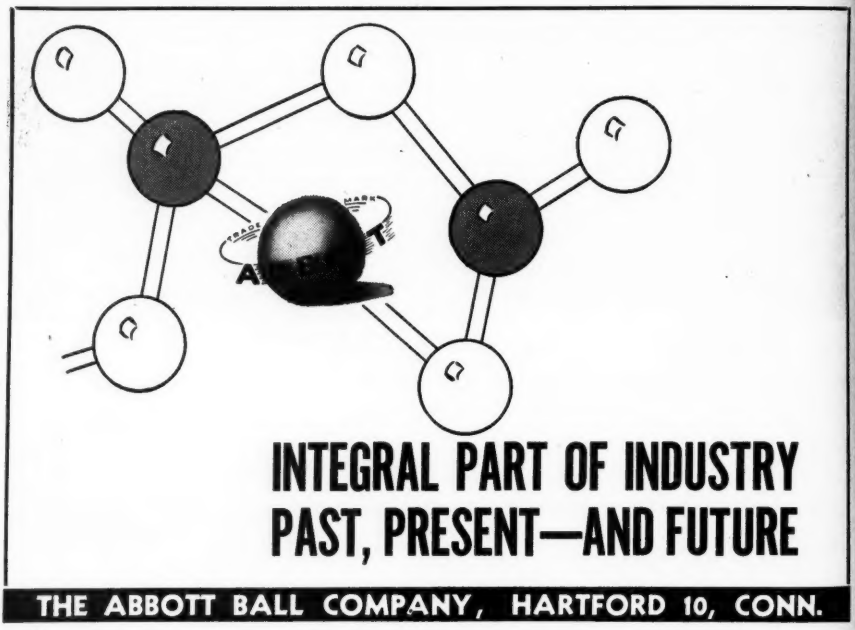
of an animate operation against an inanimate one where an active brain and an agile pair of hands is pitted against an inanimate object such as a burnishing barrel with no powers to reason or to think. Thus it is hardly reasonable for anyone to suppose that equally comparable finishes might be obtained by both methods. It is true that on various parts finishes that may be considered as acceptable are obtained but there is a wide difference between the words "acceptable" and "comparable."

We have been very interested in this business of "cutting" and "coloring," the two terms descriptive of the operations generally carried out with set-up wheels or loose or sewed buffs, and the broad line of compositions, both grease and greaseless, used in connection with their operation. For quite some time we have made it a point to ask every polisher with whom we chanced to get into conversation the question, "Which would you rather do, cut or color?" Any polisher reading this will readily understand when we say that the operation of coloring wins by a broad and handsome majority. Indeed, in most every case the preference was for the final or coloring operation rather than the intermediate one of cutting. It all sums up in the answer of one polisher when he said, "Cutting is the pick and shovel work of this job, but coloring represents the expression of the operator's artistic sense where he can subdue the low lights and bring up the high lights and thus have contrast."

Some other operators expressed no special preference saying that it was all in the day's work and it mattered little to them which operation was assigned to them. In further discussion it was readily agreed by those favoring coloring that if some arrangement could be worked out whereby the parts could be prepared up to the point of the coloring operation, that such meth-



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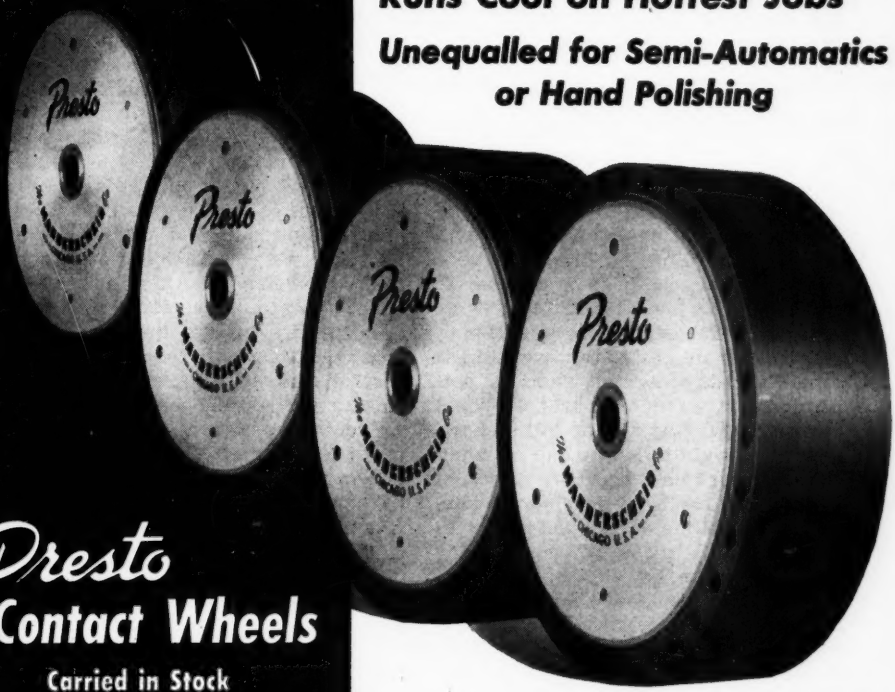

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od or means would be of distinct advantage in the final finishing operation and would unquestionably cut production costs, as well as increase production volume. That is the moving factor of this discussion.

We finally came to the point where our interest in these two operations, shall we say, got a bit out of hand and we determined to have a try at it ourselves. Therefore, we went to a friend of ours who operates a fairly good sized electroplating establishment and said to him, "Bob, I'd like to serve a brief apprenticeship as a polisher if you can find a place to let me work at it say for at least half a day?" Being generous he suggested that we make it some Saturday morning when the polishing room was idle so that we could have full sway at all the lathes however they might be set up and we could cut and color to our hearts content and in this way try to determine for ourselves which job we would prefer to handle as a matter of production or as regards the finishes that could be obtained. This would also enable us to make our own comparison by actually working on the parts themselves to see what we could accomplish with buffs and wheels that we could not do heretofore with barrels. Being a general job shop, there was a wide variety of parts on which to practice, including brass, cast iron, aluminum and bronze parts in the form of stampings, forgings, and castings.

It would be like us to first select a brass sand casting weighing about three quarters of a pound, the surface of which was as rough and uneven as the sand in which it was cast and having a nub on one side where the gate had been roughly sawed off. First we ground off this nub and a few other major projections on a hard 80-grain wheel reasonably close to the surface. We then set out to cut the balance of the surface to some degree of evenness only to find out, and pretty quickly too, that we were holding something that was even hotter than the proverbial hot potato. As a result, we wound up with two pads of quadruple thick canvas with which to hang onto the casting and so complete the overall cutting part of the job. Progressively we "cut" two each of four varieties of parts to a degree that seemed to suit our own fancy and from there we went to the "coloring" part of the job, which was much more to our liking. The cutting job left a dull, scratchy finish, however, when we got to the coloring part we found that it was not too difficult to reduce the scratches and gradually see the beginning of a fine finish. We finally concluded the operations with a lime finish.

The reader should have little difficulty in sensing just what we were working after in going through with this form of brief apprenticeship since it was two-fold; first, to determine just what sort of a finish was required to

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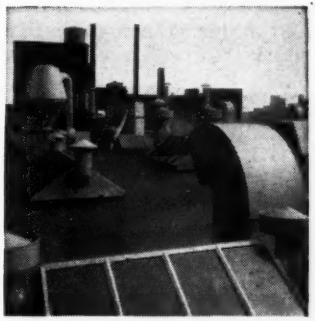

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be obtained in the so-called "cutting down" operation to adapt the parts for their final coloring operation, and secondly whether a finish could be obtained in a barrel that would be reasonably comparable to the finish obtained in the cutting down operation, when set-up wheels and other fast cutting abrasives were used. This was not too difficult either because we had often been able and without difficulty to obtain even better than required finishes than those obtained by cutting down with wheels, using soft cutting down materials and abrasives in barrels and in reality performing what is more often termed a "barrel grinding job."

It is at this point where you will sense the application of the title of this discussion; namely "Barrel Finishing As an Intermediate Operation." If we take the very steps through which we passed in our brief apprenticeship, all of which was, of course, under continuous supervision, we find that on parts such as those on which we worked, that if the remainder of casting gates and the worst of the surface projections were ground off with a fairly coarse wheel and reasonably close to the surface, that the parts could then be barrel finished by a conventional barrel cutting down operation to a point very reasonably comparable to that obtained by the hand operation and indeed more uniform, and that coming from the barrel they would then be ready for the final hand coloring operation.

Now suppose we try to reduce all of this to some reasonable operating figures. The parts having been "snagged" of their remainder of casting gates and surface projections are ready for the barrel finishing operation. We take, for example, a 33 x 19-inch cast iron barrel of the Abbott type which, of course, will be unlined. In this barrel we could then operate 600 pounds of soft barrel finishing materials along with 400 pounds of castings, thus providing a weight factor of 1,000 pounds for the operation. On forgings or cast iron parts, a sharp fast-cutting abrasive material would, of course, be indicated, however, on non-ferrous parts a softer and what we would term a more friable type of abrasive should be used. The form of bond that you use for holding the abrasive material in suspension in the mass will be important, but for our own choice we would most surely select what is termed crystal clear Karo corn syrup, cut 50 per cent with water. Then, instead of operating the barrel at literally breakneck speed, we would reduce the r.p.m. of this size of barrel to as near 8 as we could get with our line shaft and pully setup, and the barrel with this load will be just slightly more than ½ full.

Many of you will ask, "But why this very low barrel speed?" The answer to this is that when a barrel of this

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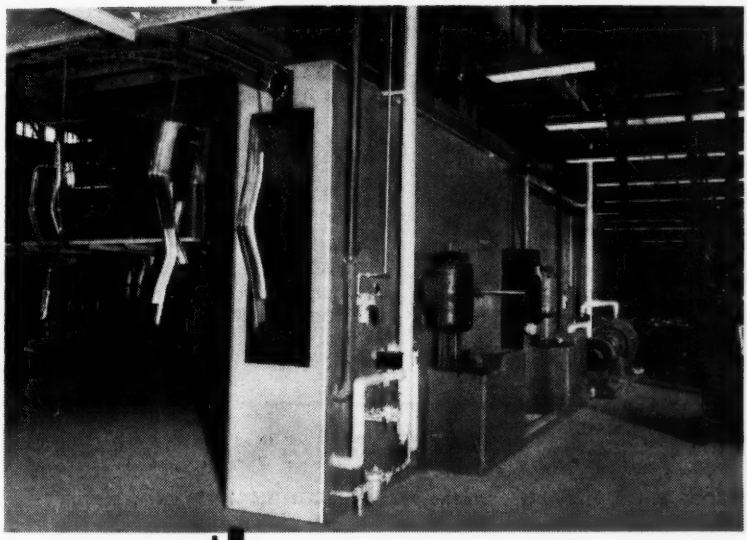

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size is loaded for operation the mass will be level clear across the barrel, but at 8 r.p.m. and the barrel operating counter clockwise, the mass at the back of the barrel will rise a full nine inches before it starts to flow around the axis of the barrel, thus presenting the surface of the mass as an inclined plane. Always remember that even though you might assume that the parts in a barrel travel around the complete circle of the periphery of the barrel that they do nothing of the sort, because if you were to view the load in the barrel as such you would find it to be not unlike an orange with almost half the top side sheared off. Parts in operation will follow the arc of the circle on the under half of the barrel but they do come to the surface on the upward lift of the mass, and, if the barrel is operated at too high a speed, then such parts coming to the surface will be unable to retain their position and due to the higher speed that lifts the mass higher on one side of the barrel, such parts will slide rapidly down the inclined plane of the mass, making impact contact with parts that preceded it and that have not as yet been re-incorporated into the mass. It is here that nicks, digs, and scratches that could not be cleaned up in any subsequent operation occur, and thus in any so-called cutting down operations where cast or forged parts are operated, slow speeds are safest and assure a far smaller contribution to the factory scrap heap than would be the case if high barrel speeds were generally adopted.

As to the best grain size of abrasive to use in these cutting down operations where we are seeking to obtain finishes comparable to those obtained by cutting operations using wheels, last month we discussed with you a not widely used form for evaluating the production value of various sizes of steel burnishing materials. We see

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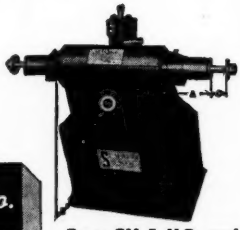
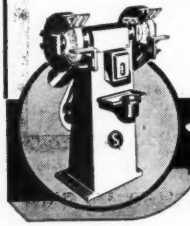


Type RV 5 H.P. and 7½ H.P.



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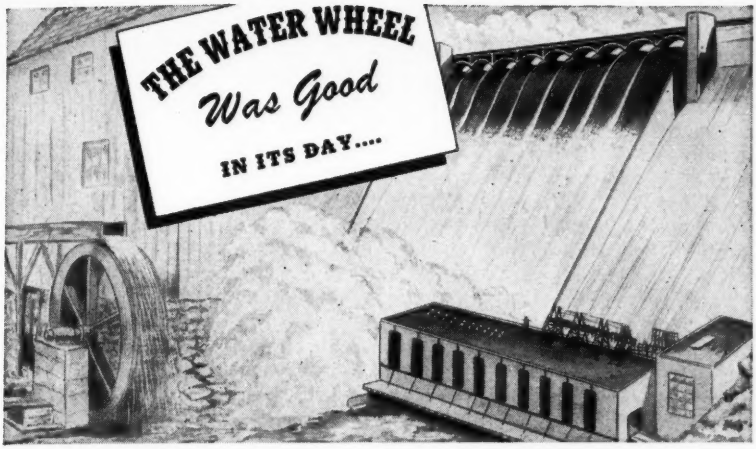

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no valid reason why the same logical reasoning should not be applied to abrasives as well as steel burnishing materials.

You will recall that we tried to point out to you that the average operator of a barrel reasons that since a 1/16-inch steel ball is just half the size of a 1/8-inch steel ball that it should provide just twice as many points of contact per pound of balls used, but that in reality a 1/16-inch ball will provide 27,904 points of contact per pound of balls whereas a 1/8-inch ball instead of providing just half that number will actually only provide for 3,474 points of contact per pound of materials used. If the cubic content of steel burnishing balls increases to such a marked degree as to provide a wide variation in the number of points of contact per pound of balls used, surely the same rule applies to the average sizes of abrasives used. In other words, it would seem a bit foolish to contend that an abrasive material screened to 1/16-inch mesh would only provide twice the number of contacts per pound of material than a material screened to 1/8-inch. In such a cutting down operation as we are suggesting, it thus becomes important to know whether we are obtaining 10,000 cutting points of contact per pound or whether we are only obtaining 2,500 points of contact per pound. We have never tried to count the number of grains of any size abrasive in any given weight. Perhaps the abrasive manufacturers have tables giving this information, and if any of them have such tables and chance to read this they may be sure that we would be grateful to receive this information.

Not all factors in evaluation of materials can be treated in precisely the same way. In steel burnishing materials, the size is always maintained save in the slight losses occurring in the use of soft materials with abrasives where the surface area of the steel materials is reduced as well as the parts in process. In abrasives, we can start with a given size, and in all of our contacts with abrasive men we have been taught that the initial or original cutting edges are most important, and that as these original edges are rounded off by their cutting activity the abrasive should be such that the pressure or impact developed in the barrel mass itself should be sufficient to cause the abrasive grains to pursue a course of fracture and refracture and the continuous presentation of new cutting edges to provide the greatest efficiency. In this way, while the abrasive might be comparatively coarse in size in the beginning, the continuous process of fracture and refracture gradually reduces the grain size from a strictly cutting grain to a very fine polishing grain. It is an abrasive of this type that we have specifically in mind for use in this thing that we term an "intermediate" operation.

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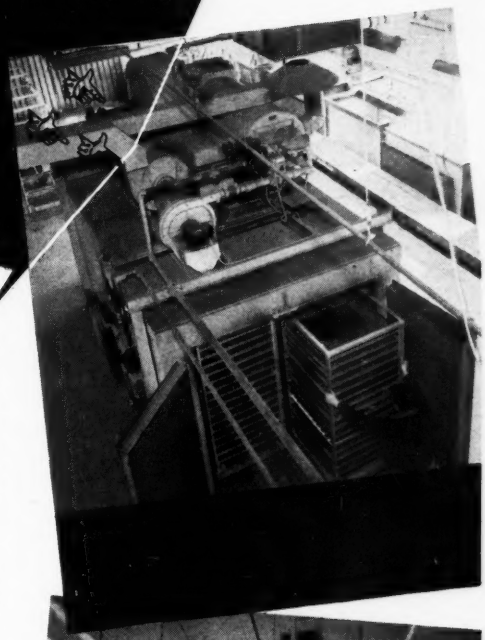

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Let us say that we have fourteen polishing lathes lined up in a row, each with an operator. Now if two 33 x 19-inch cutting down barrels, given say two days head start, will provide a sufficient quantity of parts so that instead of seven men working on cutting and seven on coloring, the entire fourteen can be used for the coloring operation alone, isn't it reasonable to assume that the production ratio will increase and the production cost will drop materially?

All of our barrel manufacturers are most liberal in their offers to process parts for you, and if your work comes within this category and this discussion has an apt illustration, why not send some of your castings and forgings to several of these barrel manufacturers and have them give you a demonstration finish. You can take the "cut down" parts as they come from the barrel manufacturer and have your polishers give them their final "over the counter" finish and then try to determine for yourself just what barrel finishing as an intermediate operation can do for your production. Surely, if it is true that the answer to most of our troubles is in obtaining greater production at lower production costs, then for such manufacturers who both "cut" and "color" it might be well worth their while to give this phase of barrel finishing procedure their careful consideration.

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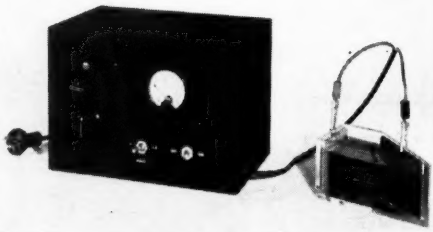

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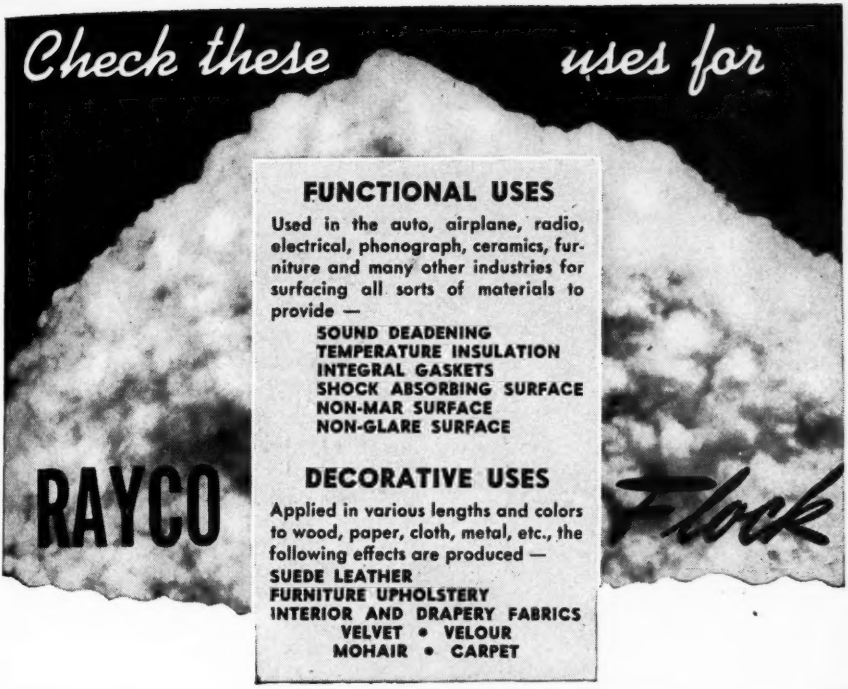

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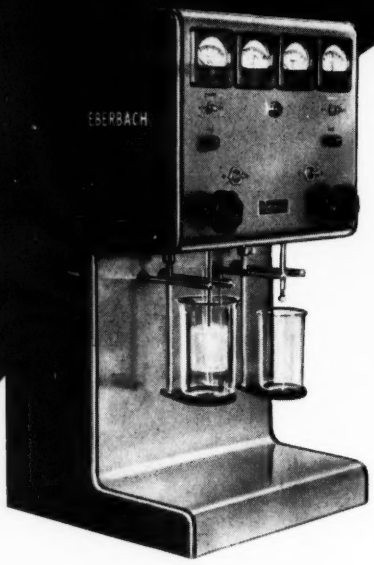
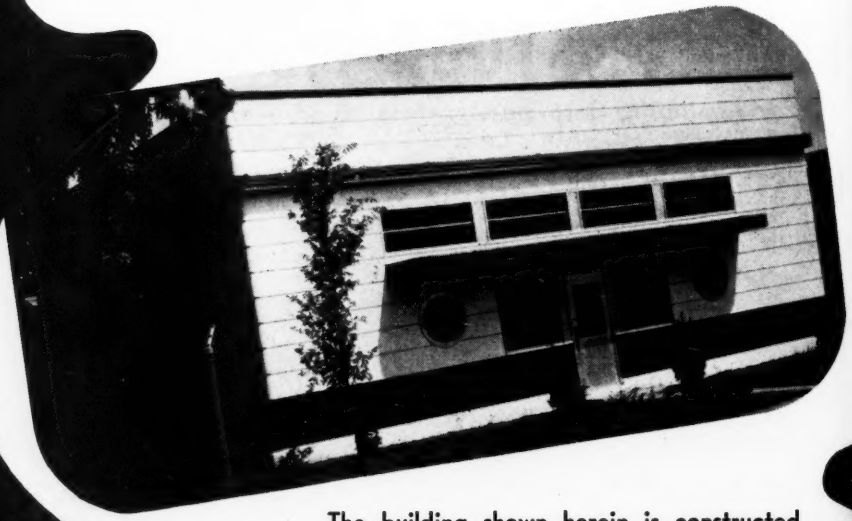


Recommended for determinations of nickel, copper, lead, antimony, cadmium, zinc, chromium, and other materials, the electro-analysis apparatus illustrated herewith features heavy gauge stainless steel front surfaces to resist corrosion from acid fumes. The sides of the unit are cast aluminum which is black wrinkle coated.

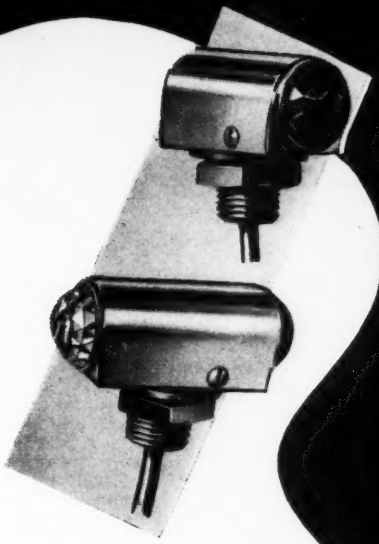
(Photo courtesy Eberbach & Son Co., Ann Arbor, Mich.)



The building shown herein is constructed primarily of Armco ingot iron with porcelain enamel finish.

(Photo courtesy The American Rolling Mill Co., Middletown, Ohio)

that in appearance and utility

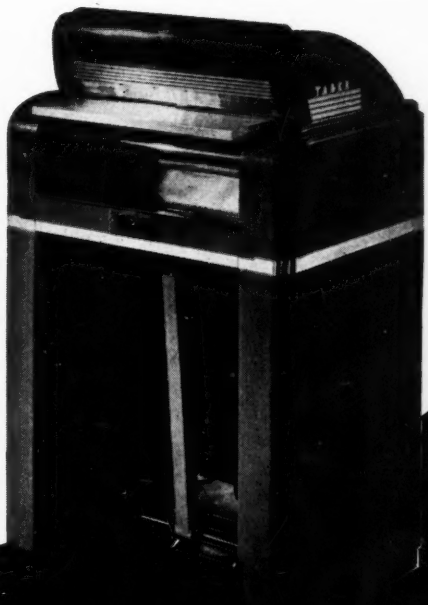


Said to draw only 11/100 ampere per hour, this lightweight fender parking lamp is provided with an attractive chrome-plated finish for durability.

(Photo courtesy The Teleoptic Co., Racine, Wis.)

Designed expressly for the production-basis fast-folding of rigid thermoplastic sheeting ranging from 0.005 to 0.020 inch, the Taber Thermofolder shown here is handsomely finished in rich tan "Hammertone" enamel to enhance equipment appearance, as well as to promote and encourage cleanliness. Polished aluminum band trim provides a strikingly simple yet unusually attractive complement to the quality finishing job.

(Photo courtesy Plastics Equipment Division, Taber Instrument Corp., North Tonawanda, N. Y.)



NEWS of the Industry

Bucy Appointed General Manager

Ed. H. Bucy has been appointed general manager of the Atlas Powder Company's cellulose products department, according to Isaac Fogg, president of Atlas. Mr. Bucy, assistant general manager of the department for the past four years, succeeds J. K. Weidig, who has resigned.

In his new capacity, Mr. Bucy heads both sales and production activities of the Zapon-Keratol Division and the Zapon Division. Mr. Bucy has been actively engaged in the protective and decorative coatings industry for over 25 years and has been instrumental in the development of several new finishes. In 1921 he started with the Waukegan (Illinois) Chemical Company, industrial finish manufacturer, which company later became the Brevolite Lacquer Company and was acquired by Atlas in 1933. Following the acquisition of Brevolite, Mr. Bucy was made technical director of the Zapon Division of Stamford and served in this capacity until 1942, when he was called to Washington by the government as consultant to the War Production Board. Later he became chief of the protective coatings section of the War Production Board.

Ed. H. Bucy

Mr. Bucy is active in numerous organizations of the industry. He was president of the New York Paint, Varnish and Lacquer Association in 1945, and served the association in 1944 as chairman of the products finishes committee. He is a member of the New York Paint and Varnish Production Club.

Added to Engineering Staff

The Richardson-Allen Corporation announces the appointment of Warren Master to its engineering staff as a rectifier engineer. Mr. Master received his E. E. degree from Lehigh University, and during the past 20 years has been engaged in the development of special electro-mechanical devices and equipment for the utility, industrial, and aviation fields.

Warren Master

For several years prior to his present connection, Mr. Master was associated with the Federal Telephone and Radio Corporation as a development engineer on selenium rectifier equipment. In his new position, he will continue his developmental work for the Richardson-Allen Corporation Rectifier Division on closely-regulated d.c. power supply equipment.

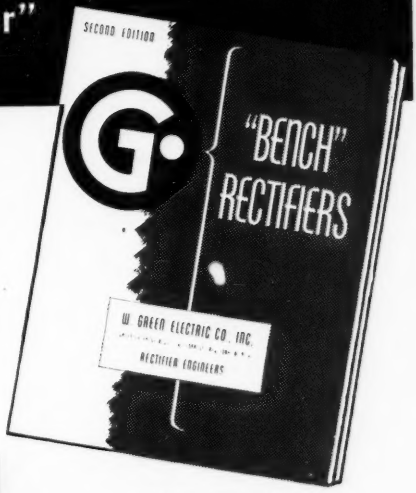
Heads Waverly Department

The Waverly Petroleum Products Co., Philadelphia, Pa., announces the appointment of Thomas F. O'Brien as head of its "Troxide" Department. Mr. O'Brien is well grounded in this work, having earned a master's degree in atomic physics and a certificate in metallurgy, as well as having taught metallurgy at schools in Philadelphia and Brooklyn.

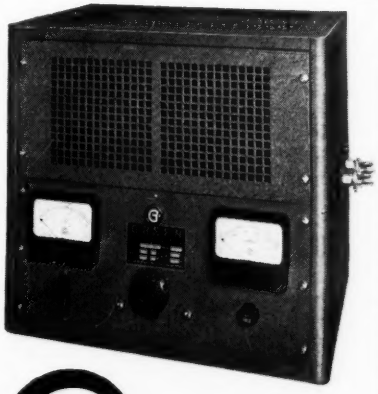
In addition, Mr. O'Brien was assistant metallurgist for the Philco Corp., Philadelphia, Pa., chief metallurgist for the Eastern Aircraft Division of General Motors, Trenton, N. J., and has also had sales experience in selling chemicals to the metals industry.

FREE to all!

2nd Edition of the Green "Bench Rectifier" Book



A handy reference volume for all engineers and executives. It will be sent to you without charge or obligation. Address your request on your business letterhead.



GREEN "Bench Rectifiers"

For laboratory and small production work. Outputs: 6, 8, 12, and 16 volts; 150 to 1,200 watts. Incorporating the same careful engineering as Green's big 5,000 ampere units.

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RECTIFIER G ENGINEERS

Pittsburgh Plate Appoints

Three executive appointments in the paint division of the Pittsburgh Plate Glass Company have been announced by

(Left) Paul R. Croll (Right) Dr. William H. Lycan

Harry B. Higgins, president. Paul R. Croll has been named assistant to the vice president in charge of the paint division. In addition, he will have overall responsibility for manufacturing operations of the various branches of the paint division.

Associated with the company's paint division since 1922, Mr. Croll joined the firm as a research director with headquarters at Milwaukee, Wis. In 1940, he was appointed technical assistant to the vice president and transferred to the company's general offices at Pittsburgh, Pa. A graduate of the University of Illinois. Mr. Croll is a member of the American Chemical Society, American Institute of Chemical Engineering, and American Society for Testing Materials.

Dr. William H. Lycan, formerly director of paint division research with headquarters at Milwaukee, has been appointed executive director of research with offices at Pittsburgh. He will have jurisdiction over all paint division research, new product development, promotion, and marketing. Dr. Lycan held a Pittsburgh Plate fellowship at the Mellon Institute in Pittsburgh prior to joining the firm's glass division in 1938. In 1940, he was appointed director of research for the paint division.

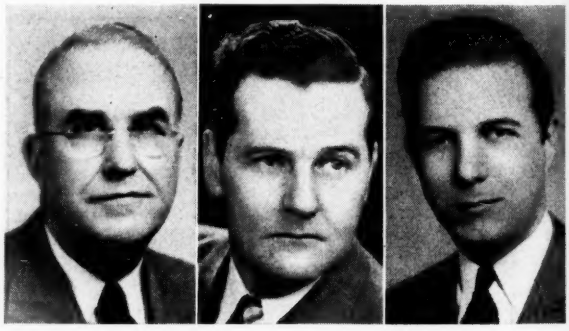
Dr. Howard L. Gerhart, staff chemist at the Milwaukee research laboratory since 1937, has been appointed director of research for the paint division, with headquarters at Milwaukee.

Changes in Wyandotte Chemicals Sales Staff

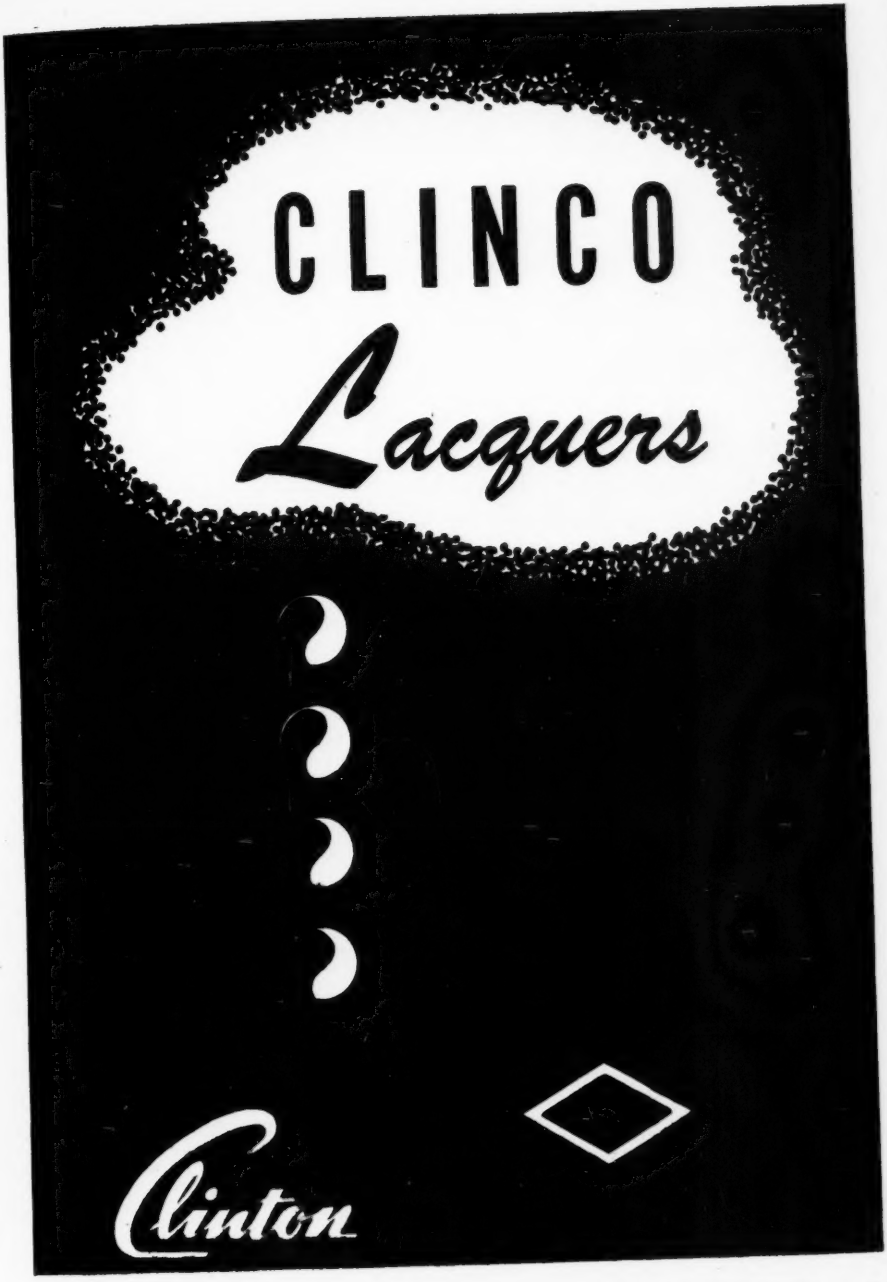
The Wyandotte Chemicals Corp., Industrial Dept., Wyandotte, Mich., announces several changes in its sales staff. James Poulson has been shifted to the Pacific Coast, with headquarters in the Los Angeles office of the Wyandotte organization. Mr. Poulson has serviced Wyandotte industrial accounts in the Milwaukee territory since 1938. Previous to this he spent seven years with two nationally known oil companies and 10 years as a partner in a manufacturing business which produced polishing compounds and solvent cleaners.

Lawrence E. Glynn has been serving Detroit area Wyandotte industrial accounts for over a year. For four years he was plant metallurgist, Aviation Division, Chevrolet Motor Car Company, in charge of plating and heat-treating process control. Mr. Glynn is a member of the American Society of Metals and the American Electroplaters' Society.

Robert J. Racine replaced Mr. Poulson as Wyandotte Industrial Department representative in Milwaukee, and has been in this territory about a year. He joined Wyandotte Chemicals following 29 months with a combat engineering bat-



(Left to Right) James Poulson, Lawrence E. Glynn, and Robert J. Racine


CLINCO
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talion in the Pacific operations. Mr. Racine received his technical training at Michigan College of Mining and Technology. Before being assigned to the Milwaukee territory, he was given practical field experience in Wyandotte industrial operations in several territories.

Optimus Detergents Appoints W. C. Thiess

William C. Thiess has been appointed field service representative by the Optimus Detergents Co., 140 Main St., Matawan, N. J., manufacturer of industrial cleaning materials. Mr. Thiess, who will cover Philadelphia and Baltimore areas, has had an extensive experience in the industrial cleaning field, having formerly represented Oakite Products Inc., and more recently been a member of the staff of the Detrex Corporation.

William C. Thiess

Opens New Resin Manufacturing Plant

The General Electric Company, announces the opening at Anaheim, California, of its new resin manufacturing plant which was designed and built by the Chemical Plants Division of Blaw-Knox Company. The plant will be devoted exclusively to the manufacture of alkyd resins, and its products will be shipped by tank cars, tank trucks, or drums to West Coast industrial users, other General Electric plants, and to the export trade.

The design of the plant includes many new improvements in resin manufacture, such as Dowtherm high temperature heating, instrument control, fume elimination, complete fire protection, and welded building construction. The G. E. Glyptal alkyd resins such as will be manufactured at Anaheim are used in surface coatings such as enamels, industrial finishes, and insulating varnishes.

Joins Hilo Varnish Corporation

David Busker, formerly with the Cellulosic Products Division of Roxalin Flexible Finishes, Inc., Elizabeth, N. J., and the Paint and Bituminous Section of the National Bureau of Standards, Washington, D. C., has joined the research and development staff of the Hilo Varnish Corp., Brooklyn, N. Y. Mr. Busker is a group leader in charge of organizing and conducting research and development in all phases of furniture finishes.

Elected President of New York PV & LA

The New York Paint, Varnish & Lacquer Association announces the election of Gustave Klinkenstein to the presidency of its organization for the year commencing May 9, 1947.

Mr. Klinkenstein is vice president and general manager of the Maas & Waldstein Company of Boston, Chicago, and Newark, and the Smith - Davis Paint Company of Los Angeles, manufacturer of specialized production finishes. He has been active in the New York Paint, Varnish & Lacquer Association for a number of years, having participated in the work of numerous committees, recently being the chairman of the Specialized Production Finishes Sales Committee as well as on the Executive Committee.

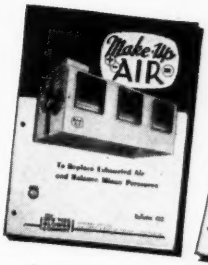
Gustave Klinkenstein

A.E.S. Cincinnati Branch Elects Officers

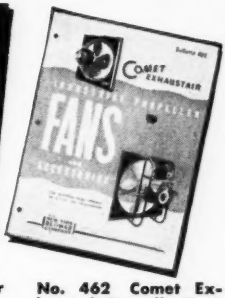
At a recent meeting of the Cincinnati Branch of the American Electroplaters' Society, the following officers were elected: President, John F. Daymude; vice president, August Schwering; secretary, L. M. Rasmussen; treasurer; Charles T. Nuzum; librarian, William Albohn; and assistant librarian, H. Nice.

No. 461 Type GI Industrial and Heat Fans. For dust and gas removal, conveying materials, and handling of hot air and gases in industrial processes. 13 sizes. 450 CFM to 60,500 CFM.

No. 463 General Purpose (Jeep) Fans. Portable, self-contained units for Class I Industrial and Ventilating applications. Direct connected and belt driven models. 8 sizes. 400 CFM to 18,000 CFM.



No. 453 Make-Up Air Unit. To replace exhausted air and balance minus pressures. Outside air is warmed, cleaned and delivered in definite quantities to balance known loss. 4 sizes. 5000 CFM to 20,000 CFM.

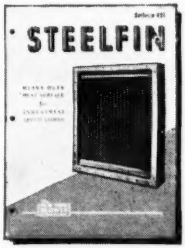


No. 462 Comet Exhaustair Propeller Type Fans. For handling large volumes of air at low resistance. 8 sizes. 400 CFM to 22,000 CFM.

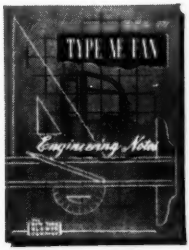
"It's in the AIR"

Are you using AIR to the best advantage in your production methods? To cut costs, increase efficiency, reduce absenteeism, safeguard health, bring comfort to workers? Air efficiently applied to process control makes possible precision manufacture and more uniform products.

When working on your air handling problems, you should have these new bulletins with their complete engineering data at hand. Any or all sent promptly upon request.



No. 451 Steelfin. Heavy Duty Heat Surface. For industrial applications. All steel welded construction. Suitable for continuous heating service on steam pressures up to 150 pounds.



No. 471 Type ME Centrifugal Fans. With slow speed or medium speed wheels with non-overloading horsepower characteristics for heating, ventilating, air conditioning or industrial applications. Capacities up to 101,000 CFM. Certified ratings.

No. 454 Comet Unit Heaters. Welded steel fin-and-tube heating element guaranteed to withstand high steam pressures. 9 sizes. 31 Mbh to 300 Mbh.

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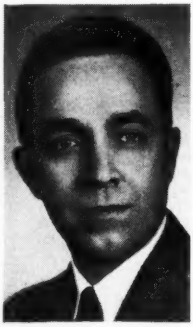
New Research Chemist for Enthone

Dr. Walter Meyer, president of Enthone, Inc., has announced the appointment of Hubert M. Goldman as research chemist, in which capacity he will work on the development of new products for the company. Mr. Goldman received his degree in chemical engineering from The College of Engineering at the University of Michigan in February 1938.



Hubert M. Goldman

From 1938 to 1945, Mr. Goldman was employed at the Norma - Hoffmann Bearings Corp., Stamford, Conn., as a research chemist engineer and plating supervisor. During 1945 and 1946, he was employed as technical director at the Connecticut Metal Finishing Company, Hamden, Conn. Mr. Goldman has been actively engaged since 1939 in practical electroplating and electroplating research, with particular emphasis on hard chromium plating. He is a past president and member of the board of managers of the Bridgeport Branch of the American Electroplaters' Society, as well as a member of the American Chemical Society, The Electrochemical Society, and Alpha Chi Sigma professional fraternity.

Taylor Instrument Appointments

Afton S. Dodge has been appointed industrial relations manager of the Taylor Instrument Companies to fill the post left vacant by the death of former Manager William F. Johnson. Mr. Dodge came with the company in 1942 as a member of the industrial relations department. Previous to that time he had done industrial relations work for service industries and was chairman of the Administrative Board for Monroe County.

Donald C. Lamb, executive of Taylor Instrument Companies for the past 24 years, has been appointed assistant superintendent. Mr. Lamb started with the company shortly after graduating from the University of Michigan with a degree in chemical engineering.

29th Annual National Metal Congress and Exposition

The 29th Annual National Metal Congress and Exposition will be held in Chicago's International Amphitheatre for seven days begining Saturday, October 18, 1947, under the sponsorshop of the American Society for Metals. Meeting simultaneously with the American Society for Metals will be the American Welding Society, the American Industrial Radium and X-Ray Society, the Iron and Steel Division and the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers.

During the week of October 20, the above named societies will conduct technical programs related to the science of metals.

H-VW-M Sets Perfect Safety Record

The Hanson-Van Winkle-Munning Co., Matawan, N. J., was awarded a certifi-

State of New Jersey

Certificate of Merit

Hanson-Van Winkle-Munning Co.

Certificate of Merit awarded to Hanson-Van Winkle-Munning Company

cate in recognition of its record as having lost no time through accidents from October 1, 1946 to December 31, 1946 by the New Jersey State Department of Labor at a dinner held recently by the Department at the Hildebrecht Hotel, Trenton, N. J. H-VW-M also reports that this perfect record has been continued through the first quarter of 1947.

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SAVE up to 65% of your Finishing Costs!

See it *demonstrated* . . on *your* product . . in Ransburg Laboratories

● **Whatever your product is,** your production facilities can be simulated in Ransburg laboratories. Thus, Ransburg can prove the applicability of the Electrostatic Spray-Painting Process to your requirements.

Experienced engineers will demonstrate *with your product* how you can increase the *effectiveness* and *efficiency* of your finishing department . . . and point out to you the production economies that will result.

Simply furnish us an outline *of your painting requirements,* including product description, coating materials used and the nature and type of layout for your finishing operation. Your request will get every consideration . . . *with no obligation.*

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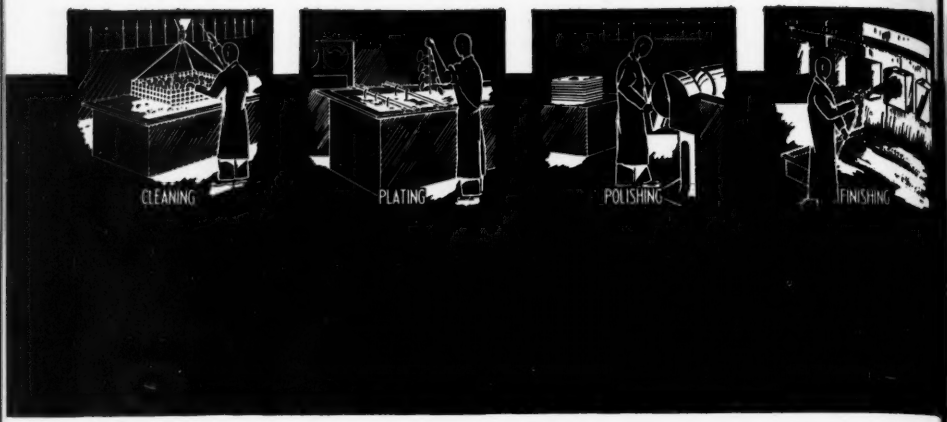


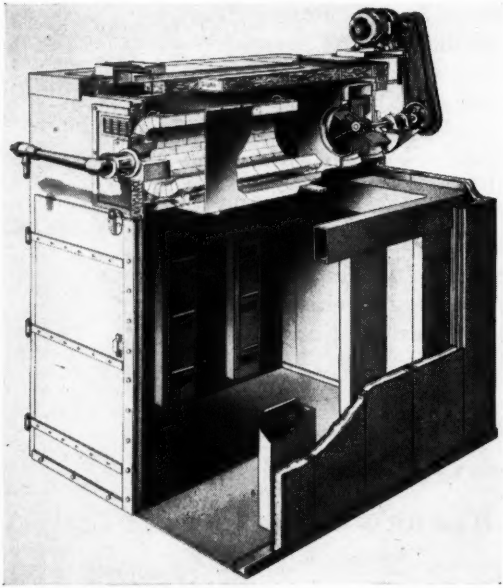
Morrison Model "C" All-Purpose Oven

Designated as the Model "C", an all-purpose oven of streamline design is announced by the Morrison Engineering Corp., 5005 Euclid Ave., Cleveland 3, Ohio. The heater, fan, and all ductwork are enclosed within the unit. Full-forced convection is said to make the oven suitable for use wherever close automatic temperature control is required, including applications involving the baking of paint finishes, drying of metal products, and so on.

The Model C is constructed of interlocking panels packed with Fibreglass insulation blankets having a very high heat loss efficiency. The reinforced oven doors are equipped with spring seals and explosion latches. The burner is mounted in front above the doors and is arranged to fire into a refractory lined combustion chamber which is supported from the oven roof. The circular combustion chamber is enclosed with a metal housing having clearance on all sides.

Directly in front of the burner at the rear of the oven is the recirculating fan. The entire fan housing is located inside the oven and is supported by the rear wall. A special bracket supports the fan shaft bearings; the inner bearing is air-cooled by means of a small aluminum fan. The fan motor is located on an adjustable base situated on top of the oven and is connected to the fan by means of a V-belt drive.

The fan outlet is connected to ductwork which delivers the hot



Cutaway view of Morrison Model "C" All-Purpose Oven showing internal construction

RECTIFIER *Facts*.. Not Fiction

Wagner-Tiedeman Electroplating Rectifiers put other sources of direct current in the horse-and-buggy class. Here are features important to electroplaters who like to keep "an ear to the ground and an eye to the future" . . .

1. FLEXIBILITY

Equipment can be shifted where needed. Eliminates costly guesswork in estimating power demands. • First installation simple and inexpensive. Expand as needed by paralleling into system. • Units quickly replaceable in case of accident. Eliminates wrecking single unit high amperage system. Unit rectifiers easily shifted in emergency.

2. LOW INSTALLATION COSTS

Lower starting loads means smaller feed lines. • Light weight permits hanging or stacking to save floor space. • No expensive foundations required. • Small units may be tucked away in otherwise wasted corners.

3. SIMPLE SERVICING

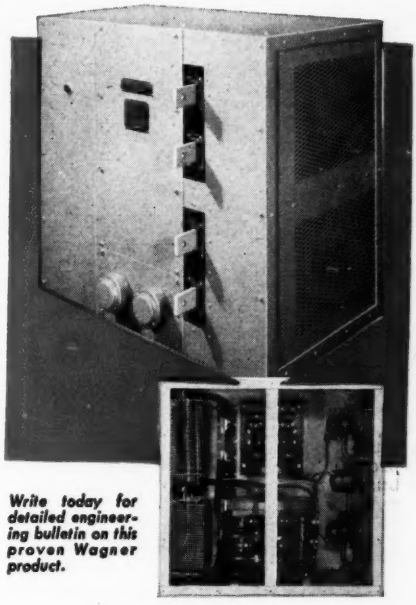
Anyone can service the three major components, fans, transformer and selenium stacks. Stacks fused, everything visible. • Parts and factory service within 24 hours. No plant tie-up for days or weeks for repairs to single unit high amperage system.

4. LOW MAINTENANCE COSTS

Eliminates special service men. • Fans are only moving parts; low velocity, low bearing speeds. • Periodic maintenance (cleaning by compressed air).

5. LOW OPERATING COSTS

Wagner-Tiedeman Rectifier produces low voltage high amperage Direct Current from an Alternating Current source for less money.



Write today for detailed engineering bulletin on this proven Wagner product.

FEATURES

Selenium-on-aluminum cells handle momentary overloads up to 1000% of normal. Effective rectifying area over 4300 square inches. Three 40-watt fans provide ample low-velocity cooling. Transformer, two winding type, reserve capacity. Welded steel enclosure for vertical stacking if higher power is desired.

SPECIFICATIONS

Output, 6 v. at 1500 amp., 12 v. at 750 amp., Input, 220/440 v. 60 cycle 3 ph., power drain approximately 12 Kw. at full load. 34" high, 36" long, 22" wide, floor area 5.5 sq. ft. Weight, approximately 500 lbs. Other voltages and current capacities available.

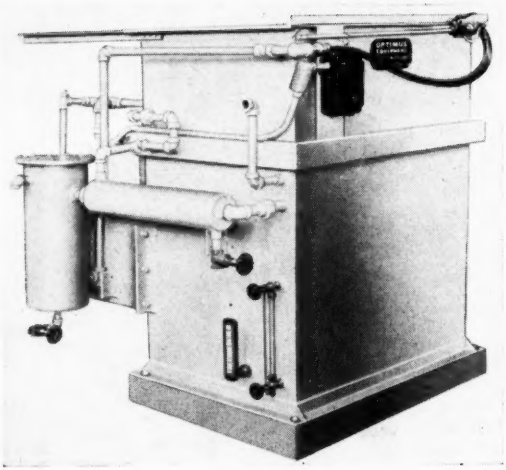
METAL FINISHING EQUIPMENT

Wagner BROTHERS INC.

POLISHING AND PLATING MATERIALS

431 Midland Avenue

Detroit 3, Michigan



Optimus Type OP-1-48 Vapor-Spray Degreaser

air to both sides of the oven through vertical ducts which are equipped with adjustable slide dampers. After passing over the work in a rapid, uniform manner, the circulating air is returned to the combustion chamber and reheated for another cycle. A portion of the recirculating air mixes with the flame so as to prevent excess temperatures in the combustion chamber. The balance of the recirculated air passes around the outside of the combustion chamber and mixes with the higher temperature air at the fan outlet.

The Morrison Model C All-Purpose Oven can be heated by oil, gas, steam, or electricity and has an operating range of from 100 to 750 deg. F. All necessary safety and temperature control equipment is supplied with the oven.

Optimus Type OP-1-48 Vapor-Spray Degreaser

Designed for use with trichlorethylene, a vapor-spray metal parts degreaser designated as the Type OP-1-48 has been introduced by the Optimus Equipment Co., 139 Water St., Matawan, N. J. The unit is fabricated of $\frac{1}{16}$-inch steel plate and reinforced by structural members and all-electrically welded.

The body of the unit and internal auxiliaries are hot-dip galvanized after fabrication. Heating and cooling coils, which are designed for maximum efficiency in the complete recovery of solvent, are readily removable for cleaning and maintenance. The unit acts as a still to recover the contaminated solvent, thereby providing a continuous supply of power distilled solvent for the spray as well as for the vapor phase.

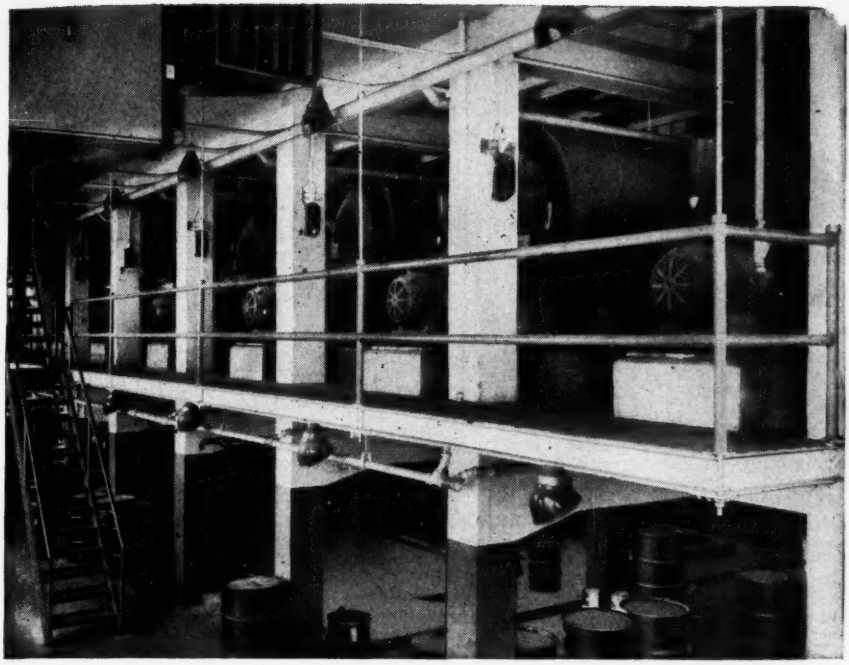
The Type OP-1-48 degreaser can be used for metal parts degreasing in maintenance operations. Chips and insoluble impurities and buffing compounds that have been worked into sharp corners or crevices can be efficiently and quickly removed by the use of a spray of the solvent directed at the work. A hand spray line made of special woven metal hose is supplied as a special feature for this purpose. Heat to vaporize the solvent may be supplied by either steam, gas, or electricity. Automatic vapor and temperature controls are optional accessories.

The degreaser has a work clearance of 45 inches long x 27 inches wide. The unit measures approximately 48 inches wide x 48 inches long x 60 inches high overall and has a capacity for handling 200 lb. of steel per hour.

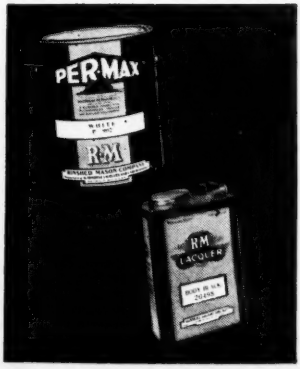
Standard Proper Speed Buffing and Polishing Machine

The Standard Electrical Tool Co., 2518 River Rd., Cincinnati 4, Ohio, is now offering its two-motor Proper Speed Buffing and Polishing Machine with an overhand base construction as illustrated herewith. The "E" dimension is 13 inches and reflects a convenience in handling large and bulky work. The "A" dimension is 7 inches standard, but can be made 11, 17, or 20 inches or to order.

As illustrated, each side of the machine is independent of the other, having its own motor, starting equipment, multiple V-belt drive, shaft lock, and so on. This arrangement permits operators to work independently on each side of the machine. Optional equipment includes a handbrake for quickly stopping the spindle or the coincidental arrangement of stopping the spindle and shutting off the current.



New ball mills boost R-M output 25% . . .



INCLUDED in the newest $500,000 R-M plant addition are rows of high-capacity steel ball mills which are helping to increase production of R-M lacquers and enamels over 25%.

Unnecessary handling is eliminated because of a 'continuous-flow' or 'gravity' process which routes ingredients from the top or fourth floor through to final packaging and shipping on the ground floor.

Production facilities are being expanded rapidly, as the demand for R-M finishes increases.

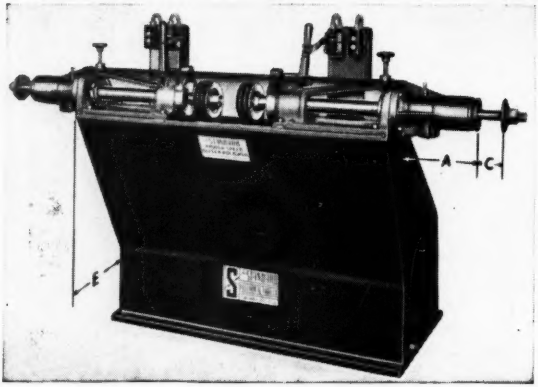
R-M finishes are specified by the manufacturers of America's finest cars, farm implements, road equipment, refrigerators, stoves, office appliances and countless other domestic and industrial units.

R-M
REG U S PAT OFF

Manufacturers of passenger and commercial car lacquers • enamels • undercoats • putties • tinting colors • reducers • removers rubbing compounds etc

Rinshed-Mason Company

5935-71 MILFORD AVE. • DETROIT 10, MICH.



Standard Proper Speed Buffing and Polishing Machine

The Standard Proper Speed Buffing and Polishing Machine is available in sizes to include 2, 3, 5, 7½, 10, 15, and 20 h.p. motors. The spindle speeds are of the user's own selection. The machine is also available with a "Speedial" control on each spindle to provide an infinite speed range between 1,500 and 3,000 r.p.m. Each spindle assembly is equipped with three ball bearings which are adequately protected in liberal size oil reservoirs. A sight feed oil gage is provided on each bearing housing. Each spindle has Acme threads and hard bronze spindle nuts.

Miller 8319 Chrome Rouge

A composition for chrome coloring prior to the application of baked enamel or lacquer, to be known as Miller 8319 Rouge, is announced by the J. C. Miller Co., Grand Rapids 4, Michigan.

Features and advantages claimed for the material include fast cut; high color; extreme ease in removal of any burned chrome spots; total elimination of cleaning, racking and unracking; and maximum adhesion of baked enamel or lacquer to the buffed chrome surface.

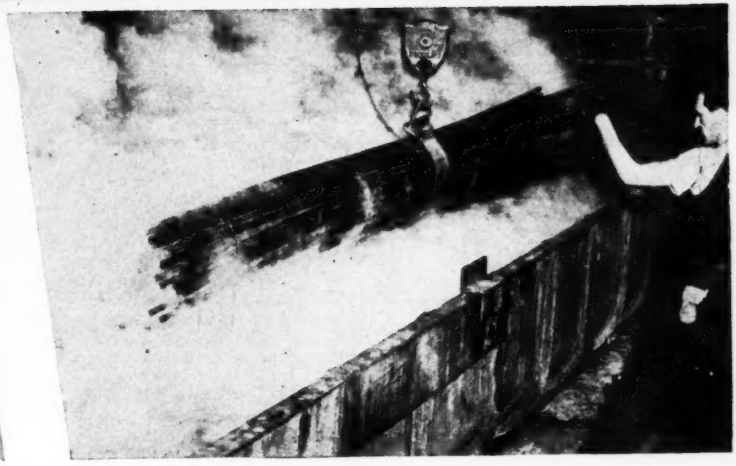
Grainlock
Polishing Wheel Cement

We Do Not Send Samples
Better Still, We Bring Them To You
Your Job Is Set Up To Your Entire Satisfaction
You Cannot Beat This Offer or The Results Obtained

Write Us Today

INDUSTRIAL LUBRICANTS COMPANY
5736 TWELFTH STREET **DETROIT 8, MICHIGAN**

NEW CAMBRIDGE DUPLEX SLING



Speeds operations . . . lowers costs on pickling, annealing and cleaning

FREE—valuable technical information. Practical reference catalog on wire crates and baskets. Write Dept. 18 for copy.

With this new Cambridge Metal Sling, steel and alloy tubing, bars and shapes are handled more easily, more economically. The soft, firm grip of this unique metal mesh sling protects against scratches on fine finished materials; guards against collapse on handling thin wall tubing. Easily placed around tubing or bars and hooked on the hoist in one quick operation. Available in any metal or alloy that can be drawn to wire form to meet conditions encountered in various operations. If you're looking for a simpler, lower cost way of pickling, annealing or cleaning — you're wise to look into this efficient Cambridge Duplex Sling. Write today to Dept. 18.

CAMBRIDGE WIRE CLOTH CO.
CAMBRIDGE, MARYLAND
Boston • New York • Baltimore • Pittsburgh • Detroit • Chicago • St. Louis

"CorOdex" Rust Remover

A liquid rust remover which is said to be unusually effective on any metal surface, to be known as "CorOdex," is now being produced by the Allied Products Co., Dept. R152, 1133 W. Newport St., Chicago 13, Ill. According to the manufacturer, the material will remove even the thickest coat of rust, is so penetrating that it reaches pin point spots, pits, crevices, cracks, or corners, and can be applied in a minimum of time with a paint brush or cotton swab.

In addition, CorOdex requires no rubbing, is non-explosive and non-inflammable, and will not injure metal or the hands of the user, it is claimed. Small rust-coated objects may be treated by dipping in a glass, jar, or crock of the material. Moreover, CorOdex is said to completely remove all rust from any surface without changing the contour or shape of the article treated.

CorOdex is designed to dissolve light rust in a few minutes, while longer applications will remove a coating of rust up to ¼ inch thick, the manufacturer states. The article may then be wiped with a clean, dry cloth. Long immersion leaves the surface with a blue-black oxidized finish which is said to materially increase its resistance to further rusting.

CorOdex is available in 12-oz. and quart bottles, gallon containers, and 1 to 55-gallon drums.

Industrial Apron Recoating Process

A process whereby industrial aprons can be recoated to look like new and to serve, in many cases, as well as a completely new garment of equal size and weight is announced by the Columbus Glove Manufacturing Co., Dept. 142-N, 1836 E. Fulton St., Columbus 9, Ohio. In "retreading" an apron, any worn spots are patched and the entire fabric recoated with a Neoprene solution such as used by the company in producing new aprons.

The recoating process is applicable to white and colored aprons, as well as to standard black types. Aprons recoated by the process are claimed to be oilproof, washable, pliable, and to possess minimum weight. A circular, "Retreading Old Aprons," available from the company describes the process in detail.

McKeon's
"Liquid Sulphur"
TRADE MARK REG'D.

"The Copper Strip of Today"

Strips Evenly
No Possibility of Etch
No Hydrogen Embrittlement

DIRECTIONS:
Immerse work in 66% solution 160 - 180° F.
Dip in Cyanide.

Sulphur Products Co. Inc.
Greensburg 5, Pa.

THE INVISIBLE TOOL...

● Clean Air . . . You can't see it . . . but there's no denying its importance. Increased efficiency, greater production, fewer rejects . . . reduced absenteeism . . . all contribute to more profitable operation of any plant.

A Kirk & Blum System works wonders where a fume condition exists . . . clearing the contaminated, murky atmosphere and brightening not only your plant but your profit picture as well.

KIRK & BLUM Engineers will be glad to show you how a K & B System can improve your production . . . actually pay for itself over a period of time. The Kirk & Blum Mfg. Co., **2816** Spring Grove Ave., Cincinnati 25, Ohio.

Removing fumes from soldering and brazing operations at The Lunkenheimer Company, famous valve manufacturers.

WRITE FOR ANY OF THESE BOOKS TODAY:
"Dust Collecting Systems for Metal Industries"
"Blower Systems for Woodworking Plants"
"Fan Systems for Various Industries"

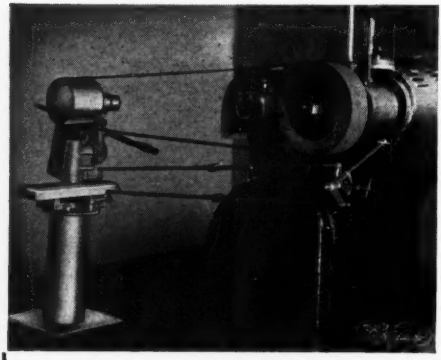
KIRK AND BLUM
FUME CONTROL

DeVilbiss Type QBD Underbody Coating System

Intended for use in the automotive field, a pump type underbody coating system that permits direct-from-shipping-container spray application of high viscosity materials has been announced by The DeVilbiss Co., 300 Phillips Ave., Toledo 1, Ohio. Designated as the Type QBD, the system includes two independent regulators which are claimed to make efficient spraying possible under varying conditions of temperature, material consistency, air supply, and hose resistance.

Independent spray gun and pump regulation allows for accurate balancing of air pressure and fluid flow for uniform application of materials at all times. The strong, direct placement action of the pump permits the delivery of ample material through the long lengths of hose required to service large trucks and busses. The DeVilbiss MBC-565 spray gun and high quality solvent-resistant material hose incorporated in the system are especially designed for heavy underbody application. The pump itself is said to be simple and economical to operate. It features a nitralloy air valve and utilizes high quality materials at all wear points to ensure long trouble-free heavy-duty service.

DeVilbiss Type QBD Underbody Coating System



DATA: Easily reversible to R.H. or L.H.; 5" side adjustment on Needle Bearings with Remote Control; Hydraulic Shock Absorber lowers weight slowly; easily tracks ¾" to 6" belts from Remote Control; Large Bearings Mounted in Arm for Lower Bearing Speeds, sealed for life with Non-Friction Grease Seals; Large Belt Length Adjustment; Counter Weighted for Steady Accurate Pressures.

DUAL REMOTE CONTROL*

MAKES THE

NIEDERST

Back Stand Idler

— the most versatile in the field!

***Remote Control for Operation Ease**—idler pulley arm swings on a turret enclosing angular adjustment mechanism. Levers conveniently located on lathe allow control of both angular and wide range of lateral adjustments from operator's normal working position.

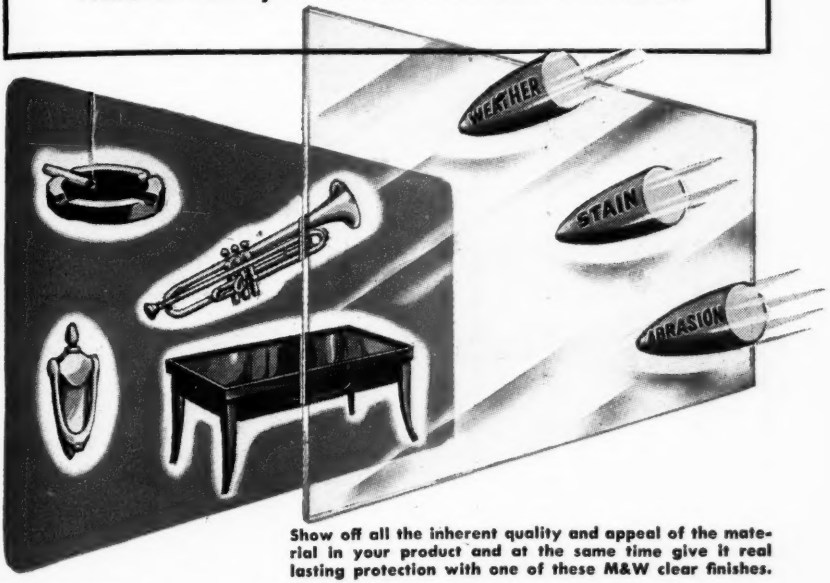
A host of other innovations achieved by the NIEDERST BACK STAND POLISHER, have earned it the title of "World's Workingest Idler." For better, faster, smoother abrasive belt polishing — *investigate NIEDERST now!*

NIEDERST COMPANY

3506 S. MICHIGAN AVE., CHICAGO 15, ILL.

LIKE BULLET-PROOF PLATE GLASS

M&W's Clear Finishes Reveal and Protect the Natural Beauty of Metals . . . Wood . . . Plastics



Show off all the inherent quality and appeal of the material in your product and at the same time give it real lasting protection with one of these M&W clear finishes.

CLEAR SYNTHETICS that can be flasn-baked, slow-baked, air-dried—in fact formulated for practically any finishing schedule—are available for wood, metals or plastics. They enhance the natural surface beauty of a product . . . form a transparent, haze-free film that is flexible, tough, resistant to weather, heat, stains and abrasions. Suitable for spray, dip or brush application.

CLEAR LACQUERS of M&W are well known for their uniform water-whiteness and unusually good adhesion even to metals ordinarily considered difficult to finish. They dry out of dust in a few minutes...harden throughout in one hour. With M&W clear lacquers, polished metals retain natural color and brilliance...take on lasting protection against stains, corrosion, weather, cold, heat—even cigarette burns. Suitable for spray, dip or brush applications.

By letting us help you choose the right clear finish for your product, chances are we can save you time, expense and experimentation. Just contact your nearest M&W representative or write directly to any of the offices listed below.

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M&WCo 1876

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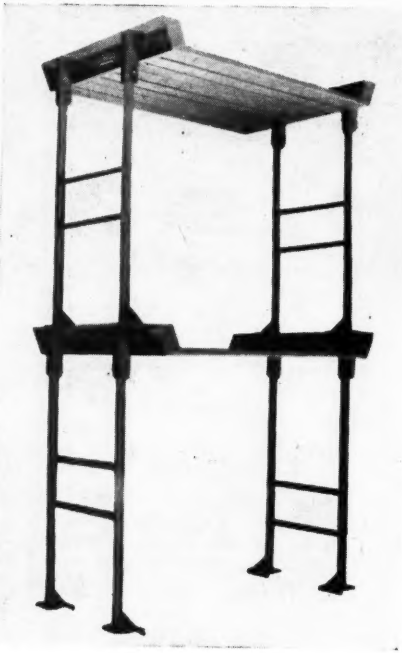
1658 Carroll Avenue, Chicago 12 • 6 Jersey Street, Boston 15 • 10751 Venice Blvd., Los Angeles 34

PRODUCERS OF LACQUERS, ENAMELS, SYNTHETICS AND SPECIALIZED PRODUCTION FINISHES

"Multi-Stak" Pallet

Said to permit the stacking of loaded pallets one upon another with complete safety to both materials and personnel, a specially designed and constructed pallet to be known as the "'Multi-Stak" is now being manufactured by the Pallet Div., Industrial Washing Machine Corp., New



"Multi-Stak" Pallet

Brunswick, N. J. The pallet is claimed to hold 4,000 lb. dead weight and includes four firmly anchored supports (to specification measurements) upon which succeeding pallets can be piled and rigidly held in place. The supports are quickly collapsible for compact storage in a small space when the pallet is not in use.

According to the manufacturer, the Multi-Stak Pallet allows unevenly piled materials to be stored or transported without risk of sliding, tilting, or spilling.

"Sleek" Brushless Paint

Known as "Sleek," a brushless paint which can be applied to metal or wood surfaces with an ordinary lint-free cloth is now being marketed by The Miller Corp., Garland Bldg., Washington and Wabash Aves., Chicago, Ill. Since it is wiped on, the paint, it is claimed, has the advantage of unusual speed of application, with experience having little effect upon the effectiveness of the resultant job.

After application, Sleek provides the appearance of a baked-enamel finish, with no applicator marks visible, the manufacturer states. The paint is said to dry ready for use, under normal atmospheric conditions, within one hour.

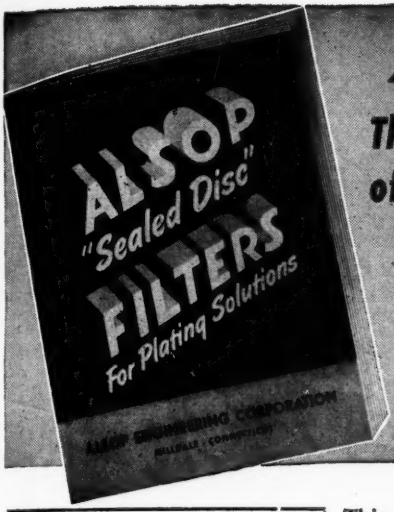
"Chemtite" Rack Enamels and Stop-Off Lacquers

A complete line of rack enamels and stop-off lacquers, to be known as "Chemtite," has been developed by the Maas & Waldstein Co., Newark 4, N. J. According to the manufacturer, the enamels and lacquers possess unusually good adhesion and resistance in the acid and alkaline solutions employed in electroplating processes, are easy and economical to use, and afford good insulation.

"Bituplastic" Protective Coating

A black cold-applied protective coating which is applicable to damp surfaces whether metal, concrete, or masonry, to be known as "Bituplastic," has been developed by the Wailes Dove-Hermiston Corp., Westfield, N. J. A dispersion in water of highly-refined plastic coal tar and pitch and other high quality materials, the coating can be applied with a brush or spray and is said to dry in from 15 minutes to 2 hours under average humidity and temperature conditons. Drying is by evaporation, with the coating forming a top film which is claimed to be impervious to water.

Containing no volatile organic solvents or noxious fumes, Bituplastic, according to the manufacturer, eliminates discomfort to workmen during application in confined places and the danger of fire or explosion. It is described as virtually incombustible and actually a fire retardant. Other advantages claimed for the material are that it does not alligator in sunlight, has no melting point, and does not sag or flow at temperatures below 500 deg. F. It is said to resist very low temperatures without cracking and can be thinned, where local conditions require, with cold water.



Mr. Plater—

This New Book on Filtration of Electroplating Solutions

Based on 25 Years Filtration Experience

Was written especially for YOU

A SUMMARY OF CONTENTS

The text outlines the standard techniques widely employed today in plating departments, describes the distinct advantages of using filters in various plating installations and on practically all types of plating solutions. It shows also various types of typical installations in different plants.

Explains the unique sealed feature which provides positive protection against loss of solution through leakage and dripping.

Describes the versatile, compact-Filters and outlines the superior features of the many sizes and capacities available.

This fact-filled book just off the press was compiled to tell you exactly how, why and where *"Sealed-Disc"* Filters can help you get finer finished plated work from your plating solutions. It contains 50 carefully chosen photos, diagrammatic views and 4500 words describing the *"Sealed-Disc"* Filters and *"Centri-Poise"* Pumps as well as explaining the Fundamentals of Filtration for plating applications.

The *"Sealed-Disc"* Filter for plating solutions was designed in 1939 based on over 17 years previous filtration experience. Now after an additional 8 years of constant improving we feel that our latest models will meet even greater success in fulfilling the demands of the plater for a dependable filtration system. Send for your NEW BOOK today . . . mail the coupon below.

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Please send me FREE, your NEW Book *"Alsop Sealed-Disc Filters For Plating Solutions."*

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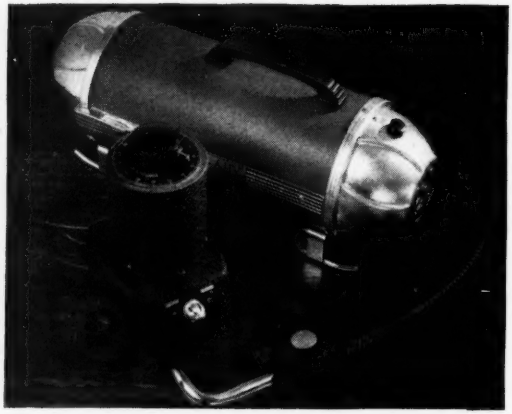

Model 100-108 Vacuum Pickup Attachment for Taber Abraser

Model 100-108 Vacuum Pickup Attachment for Taber Abraser

To simplify and speed up research techniques utilized by both manufacturers and industrial consumers of organic coatings in determining the maximum abrasion resistance of such finishes, the Taber Instrument Corp., 111-PF Goundry St., North Tonawanda, N. J., has designed a precision accessory for use with the Taber Abraser. The device, which is designated as the Model 100-108 Vacuum Pickup Attachment, is said to effect fast, thorough removal of abradings from painted, lacquered, enameled, and varnished specimens, thereby assuring continuous maintenance of uniformly effective contact of the testing instrument's calibrase wheels against the surface of the specimen undergoing test.

A powerful two-stage vacuum turbine, the Model 100-108 features a variable controllable suction which enables abrading-pickup volume to be precision regulated; conveniently centralized electrical connections for all wear-testing apparatus; and an adjustable swivel-type suction nozzle that can be easily and quickly rotated to the proper operating position relative to the wear path of wheels. Resting on the floor and completely out of the operator's way, the horizontal tank of the unit is connected to the Abraser by means of a rubber-covered flexible hose. The nozzle assembly is mounted on the right-hand arm support of the abrasion-testing instrument and is adjusted to the proper height for thickness of specimen.

Equipped with a Powerstat regulator, the Model 100-108 Vacuum Pickup Attachment is ordinarily designed for operation on 115 volts, 50/60-cycle current, but is adaptable for 230-volt, 50/60-cycle current operation with the use of a supplementary step-down transformer.

Demand the Best . .

HARRISON

4-A

COMPOUNDS

for

CUTTING-CUT AND COLOR
MIRROR FINISHING

offer

FASTER CUTTING
INCREASED PRODUCTION

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We'll send samples
to solve your problem

•

HARRISON & COMPANY, INC.
HAVERHILL **MASS.**

Green Bench Rectifiers

The W. Green Electric Co., Inc., Green Exchange Bldg., 130 Cedar St., New York 6, N. Y., announces the expansion of its line of single-phase bench rectifiers for laboratory and small-scale electroplating to include 8 and 16-volt units in addition to the 6 and 12-volt units manufactured by the company for some years. All of these units, including the Model 825S1C illustrated herewith, are described in detail in the second edition of the "Bench Rectifier" booklet.

Large full-scale production rectifiers

"FINISHES"... *by Stanley*

New plastic beach toys as well as familiar rubber goods are made *more attractive* and *more saleable* by Stanley finishes.

For example, plastic beach toys are printed in brightly colored patterns with special inks developed by Stanley for this purpose. Rainboots, balls and numerous other rubber articles get a special lacquer that brightens and protects the rubber surface.

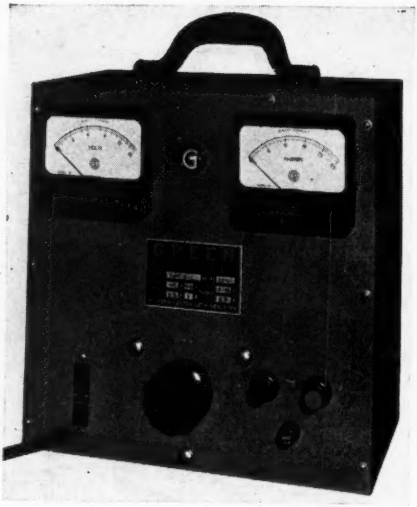
And, in the Stanley research laboratories, a staff of specialists is busily at work creating other finishes to meet the special needs of today's sales-minded manufacturers . . . finishes that dress up a product as well as protect the materials from which it is made. Why not consult us about *your* problems in finishing wood, plastics, rubber, metal, fabrics? Address Stanley Chemical Co., East Berlin, Conn.

STANLEY

STANLEY CHEMICAL

INDUSTRIAL COATINGS

LACQUERS SYNTHETICS JAPANS ENAMELS



Green Model 825S1C Portable Bench Rectifier

ranging from 100 to 5,000-ampere capacity are described in the third edition of the "Selectro-Plater" booklet, which covers over 200 standard models. Other literature available on request deals with "'Multi-Rectifiers" (for large electroplating laboratories), "Rectifier Installations," "Rectifiers for Electroplating" (a series of articles), and so on.

Turco Transpo Cleaner

Fast and thorough stripping of carbon, paint, varnish, adhesive dirt, oil and grease from automotive and aircraft engines and parts is said to be afforded by a non-inflammable cold tank cleaner designated as Turco Transpo now being manufactured by Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif. The cleaner is designed for operation at room temperature and is said to be most effective and economical when used between 65 and 85 deg. Fahrenheit.

According to the manufacturer, Turco Transpo Cleaner is non-inflammable and made virtually odorless through a liquid seal which also protects the life of the compound and assures its continued operating efficiency. The cleaner is claimed to be non-corrosive to aluminum, magnesium, cadmium plate, steel, zinc, cast iron, and tin plate.

"Prepaint" Aluminum Surface Preparation

Known as "Prepaint," a material for application to aluminum and its alloys which are to be painted or lacquered in high production is now being marketed by the Technical Processes Division, Colonial Alloys Co., Ridge Ave. and Crawford St., Philadelphia 29, Pa. Applicable at room temperature by the dip, spray, or brush method, the material is said to react chemically and bond with alumiuum surfaces in from 15 to 60 seconds in a single chemical treatment.

According to the manufacturer, Prepaint can be kept in an ordinary steel tank or container without piping, valves, or controls, and requires no heat or venting. Its coverage in area-per-gallon is described as unusually great, thus making the material economical to use. Prepaint, it is claimed, is stable, non-flammable, non-toxic, and can be stored for long periods of time. Moreover, the material is said to produce no scale build-up or deposit on tanks, racks, jigs, and fixtures of steel, copper, brass, or other metal.

START RIGHT!
INSURE A PERFECT FINISH

DETROIT
Handy 'Tac' Rags
(Trade Mark Reg.)

Remove all Dust, Lint and Sand Particles from the Surface before Finishing.
Successfully used by leading Industrial Plants for over 11 years.
If your local Paint Dealer cannot supply you, write to Manufacturer.

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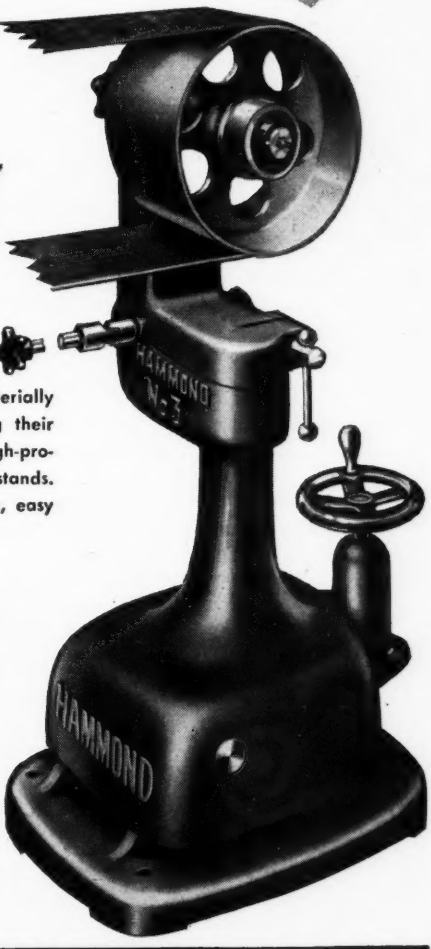
LOS ANGELES 12, CALIFORNIA

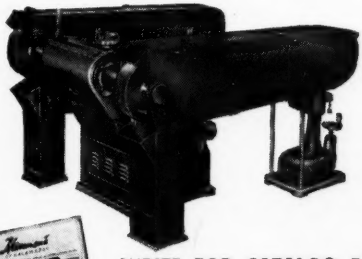
IS YOUR FINISHING ROOM STILL IN THE "GAY 90's"?

Hammond of KALAMAZOO

BACKSTANDS

Hundreds of plants, large and small, have materially stepped up finishing production by converting their wheel grinding and polishing equipment to high-production abrasive belt units with Hammond Backstands. Modernize your finishing department this quick, easy economical way. Write today for literature!





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Shows Hammond Backstands, Polishing Lathes, Abrasive Belt and Automatic Finishing Machinery. Write today!

Hammond Machinery Builders INC.

1622 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

"Sprayit" Model DS Spray Gun

Known as the "Sprayit" Model DS, a pressure feed "bleeder" spray gun which can be used as an internal or external mix gun is now being introduced by The Electric Sprayit Co., Sheboygan, Wis. The gun is supplied with internal fluid break-up nozzles and tip which can be disengaged and an external break-up nozzle and tip assembly applied. According to the manufacturer, the change-over can be made in a minute or less. The external nozzle assembly is supplied as an accessory and is known as the CKD Conversion Kit.

The convertible feature of the Sprayit Model DS Spray Gun is said to allow for the quick spraying of fast-drying materials with a minimum cleaning of nozzle parts. Application of the conversion kit eliminates the need for changing nozzles for varying the spray patterns. A turn of a self-locking adjusting ring provides for a range of patterns from a small round to wide fan without interrupting the operation of the gun.

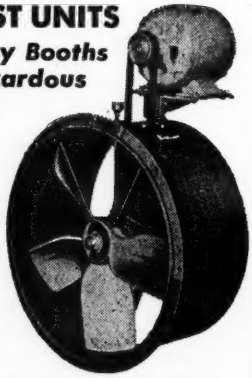
To guard against contamination of the spraying material, the Sprayit Model DS Spray Gun also includes an oil and moisture filter built into the handle. The gun can be used with either a quart aluminum container or pressure feed paint tank.

Illustration showing "Sprayit" Model DS Spray Gun together with external break-up nozzle and tip assembly

EXHAUST UNITS
for Spray Booths and Hazardous Locations

Fan Sizes 12" to 42"

Free Delivery C. F. M. 900 to 29200



Immediate Deliveries from Stock.

Also Manufacturers of a complete line of waterwash and dry type paint spray booths with accessories. *Send for details.*

M. & E. Manufacturing Co.
2571 Winthrop Ave.
Indianapolis • Indiana

Optimus No. 100 Cleaner

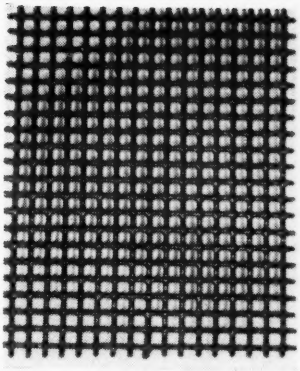
Optimus No. 100 Cleaner, a white free-flowing powder which is said to be completely soluble in hot or cold water, has been announced by the Optimus Detergents Co., 140 Water St., Matawan, N. J. A balanced blend of mild alkaline materials, including special water softening ingredients, the cleaner, it is claimed, is free rinsing and at low concentrations is soft on the skin.

An important application of Optimus No. 100 Cleaner is in power spray washing machines where it is used at concentrations of ½ to 2 oz. per gal. at temperatures from 130 deg. F. to boiling. The cleaner is said to be very effective in removing light oils, grease, and dirt and may be used on ferrous or non-ferrous metals. Also described as particularly useful in electrocleaning operations, the cleaner is available in 100 and 400-lb. containers. A variation of the cleaner, designated as Optimus No. 100A, contains the same ingredients but also embodies an efficient synthetic wetting agent for the soak cleaning of steel surfaces.

RUBBER PROCESSED ON METAL

Rubber Insulated Material Handling Screens

Furnished to size for bottom of tote pans. Prevent scratching or disfiguring plated or precision finished surfaces. Allow drainage. Unexcelled as non-skid separators. Available also in expanded metal.



ANY PRODUCTION PART OR PRODUCTION PROCESSING EQUIPMENT CAN HAVE RUBBER APPLIED TO THE SURFACE

★ **Irregular surfaces; concave, convex, sharp angles, etc., can be covered partially or entirely. ARCO rubber offers positive coverage to any desired thickness insulating for electricity, sound or contact, corrosion, abrasion or shock.**

You can use ARCO rubber insulation: (1) to protect parts and equipment, (2) on handling equipment to protect precision or delicate surfaces, (3) to conserve plating materials.

STANDARDS—FURNISHED COMPLETE OR YOUR EQUIPMENT RUBBER PROCESSED

ANODE, DIPPING & HANDLING BASKETS

PLATING AND PICKLING TANKS

TANK GRIDS AND SCREENS

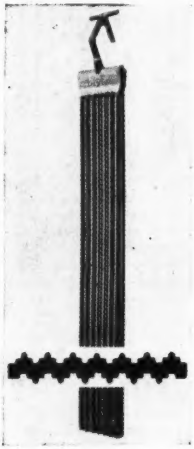
PLATING RACKS

DRUMS AND PAILS

AUTOMOTIVE RUBBER COMPANY, INC.
8607 EPWORTH BLVD. • DETROIT 4, MICHIGAN

Divco 71-Point Lead Anode

Designed to provide for maximum efficiency in plating operations, an improved anode having 71 points is now being marketed under the trade name of Divco by the Division Lead Co., 836 W. Kinzie St., Chicago 22, Illinois. Each inch of anode length has 15.5 square inches of surface.



Divco 71-Point Lead Anode

The points are arranged so as to concentrate gassing in order to create a rapid flow of solution against the surface. Stagnation is claimed to be eliminated even down to the bottom of the troughs; the large surface area and 71 throwing edges are fully utilized. Disintegration is claimed to be uniform over the entire surface, and the anode is said to retain high efficiency through a long service life.

The Divco 71-Point Lead Anode is extruded of antimonial lead. The deep-ribbed construction is said to prevent warping and buckling. The bronze hook of the anode is hot lead dipped and burned directly to the anode so as to assure positive current conductance.

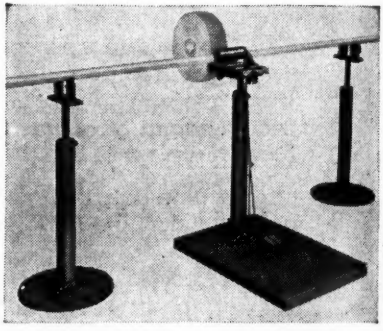
Markal Heatproof Paint

Protection against corrosion and scale at unusually high temperatures is the principal advantage claimed for a heatproof paint now being made by the Markal Co., 607 N. Western Ave., Chicago 12, Ill. According to the manufacturer, it is a functional paint and will prevent metals from corroding and scaling at red hot temperatures as high as 1,850 deg. F. It is also said to provide protection to metals under all weather conditions.

Hot metal to which Markal Heatproof Paint has been applied can be subjected to sudden temperature changes, such as quenching immediately in cold water, without cracking or peeling of the paint, it is claimed. The paint, it is stated, follows the contractions and expansions of the metal at all temperatures, thus making it ideal for smoke stacks, annealing boxes, exhaust manifolds, furnace pipes, mufflers on trucks and tractors, and so on. Applied while the parts are cold, the paint is said to dry in approximately 20 minutes, after which it can be subjected to red hot temperatures.

"Presto" Tube Support Stand

More uniform polishing and more efficient handling of long tubing on its semi-automatic tube polishing machine are said to be afforded by the "Presto" Tube Support Stand developed by The Manderscheid Co., 810 Fulton St., Chicago 7, Ill. The tubing rests on two rubber wheels located on the top of the tube support stand. By adjusting the angle of the wheels, the movement of the tubing across the polishing wheel or abrasive belt can be regulated to the required speed.



"Presto" Tube Support Stands in use

The Presto Tube Support is designed to hold tubing from ¾ to 5 inches in diameter and is adjustable from 28 to 38 inches in height.

Artisan Racks

for

ELECTROPLATING • ELECTRO POLISHING SPRAYING • DIPPING

• ENTIRELY WELDED • INTERCHANGEABLE TIPS • TEN COAT INSULATION

SERVICE NOTE: Stock Racks Rebuilt • Excellent Price Range • Immediate Quotation • Good Delivery

ARTISAN COMPANY

207 Division Avenue, Brooklyn 11, N. Y.

Phone: Evergreen 7-9227

RECTIFIER "PACKAGES" PROVIDE NEW FLEXIBILITY AT HARTFORD CHROME CORPORATION

Addition of two "2000" units speeds handling of varied plating jobs

Continuing its program of adding dependable, easy-to-use rectifier equipment to meet expanding requirements for plating power, the Hartford Chrome Corporation has recently installed two new General Electric "2000" copper-oxide rectifiers and control equipment. These power "packages," consisting of a fan-ventilated rectifier and an operator's control, have proved invaluable in providing the flexibility needed for an ever-changing variety of work.

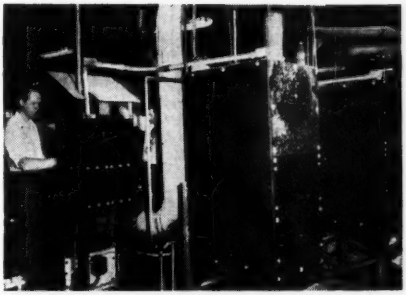
The rectifiers are installed away from working areas, free from injurious fumes. A handy, at-the-tank operator's control governs all operations, permitting instant changes in power input as they are required.

Each rectifier delivers to the plating tank 2000 amperes on one set of bus bars, or 1000 amperes on each of two sets of bus bars. It is also possible to connect the rectifiers in series, to deliver 4000 amperes. Future plans call for the addition of fully automatic motor-operated controls that will keep output voltages constant from "no load" to "full load" within ± 2 per cent of selected reading.

General Electric Equipment Selected on Basis of Past Performance

With the addition of these units, Hartford Chrome now has 12 General Electric rectifiers, with a total rating of 9000 amperes. Most of the equipment has been in operation for four to five years.

During this time, maintenance costs have averaged 25 to 35 per cent lower than those before General Electric rectifiers were installed. On the basis of upkeep, performance, and flexibility, to meet various needs of plating and anodizing, General Electric equipment has proved to be the most economical and efficient that this active plant has ever used.



View shows how rectifiers have been placed in open, nonworking area. Units are easily accessible for cleaning or repair, and are protected from dirt and vapor fumes.

Economies For Your Plant

General Electric copper-oxide rectifiers and controls are readily available in many sizes and capacities, to solve plating or anodizing problems in your plant. They offer many advantages that go a long way in keeping production costs low.

Call on us for engineering assistance, too. We may be able to show you important operating economies, based on the use of efficient General Electric plating equipment.

For information, or for your copy of *General Electric Copper-oxide Rectifiers and Controls*, write to Section A75-768, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

Arco Corrosive Solution Handling Utensils

Arco Corrosive Solution Handling Utensils

A line of unbreakable shop utensils for handling acids, alkalis, and other corrosive solutions is announced by the Automotive Rubber Co., Inc., 8607 Epworth Blvd., Detroit 4, Mich. Manufactured from reinforced perforated metal, the utensils are completely covered with a ⅛-inch seamless rubber coating that is said to protect them from the action of chemicals and protect solutions from contamination. Coatings of soft or semi-hard natural rubber or synthetics may be provided if desired.

The line includes pails of 3 and 5-gallon capacity, a 2-quart dipper, a 10-inch funnel, and measures of 2, 4, and 6-quart capacity. Special sizes and shapes of utensils are available to desired specifications.

Klarifiant

KEEPS WATER CURTAIN SPRAY BOOTHS OPERATING AT PEAK EFFICIENCY

PREVENTS

- CLOGGED NOZZLES & LINES
- WATER BREAKS
- SLUDGE IN RESERVOIR
- LOSS OF PRESSURE

FOR DETAILS WRITE

The Du Bois Company

CINCINNATI 3 OHIO

Pennsalt MC-1 General Purpose Cleaner

A general purpose inorganic cleaner designed for maintenance work but suitable for numerous other uses has been announced by the Pennsylvania Salt Manufacturing Co., 1000 Widener Bldg., Philadelphia 7, Pa. Designated as Pennsalt MC-1, the cleaner is a dry, granular inorganic material that is said to dissolve quickly in water, remove most types of soil easily, and rinse rapidly.

For industrial applications, Pennsalt MC-1 may be used in the steam gun cleaning of painted or unpainted surfaces. Two to four pounds of the cleaner is said to be adequate for the 50 or 55-gal. tank of vapor spray machines. In tumble barrel cleaning, burnishing, or deburring operations, the recommended mixture is from 2 to 8 oz. of the cleaner to a gallon of water.

Also useful for metal preparation, Pennsalt MC-1 is supplied packed in 125 and 250-lb. plywood drums.

H-VW-M Electric Glue Heater

The Hanson-Van Winkle-Munning Co., Matawan, N. J., announces the development of a portable electric heater for polishing room and other uses. Well constructed, the unit is arranged to heat quickly, the temperature being automatically maintained at 150 to 160 deg. F. by a thermostat, and is thoroughly insulated to prevent heat loss. The removable glue pot is of copper, which is nickel plated for corrosion and wear resistance.

A heavy duty, insulated electrical cord is supplied with the H-VW-M Glue Heater, which has a capacity of 2 qt. and is designed for use on 115 volts, alternating current. Special units for 230 volts, alternating current, can be supplied on order.

Ipco "Nitroflex" Apron and Sleeve

Made of a multi-purpose clear frosted plastic material for protection against

Ipco "Nitroflex" Apron and Sleeves

most acids, caustics, oils, and solvents, an apron and sleeve that are said to be light, flexible, and comfortable to wear yet extremely tough so as to resist snagging, abrasion, and wear are now being offered under the trade name of Ipco "Nitroflex" by the Industrial Products Co., 2735 N. 4th St., Philadelphia 33, Pa. No stitching is used in the manufacture of either the apron or sleeve, all seams being made by electronic sealing thereby providing the equivalent of a one-piece construction.

The apron is fitted with reinforced grommets and furnished complete with tubular laces of the same material. Slight elasticity of the laces adds to the comfort in wearing and prevents the laces from binding during normal working movement. The sleeve is 14 inches long, comfortably patterned, and fitted with an adjustable elastic band at both ends.

The Nitroflex Apron is available in light and medium weights in four sizes from 24 x 36 to 33 x 48 inches. It is also available in a heavy weight in one size of 33 x 48 inches. If desired, the apron can be furnished with a drip pocket having four snap buttons which allow the pocket to be opened up flat for cleaning.

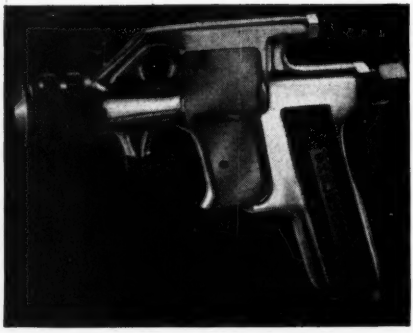
Watson-Standard P-5 Finish

P-5, an anti-corrosive co-polymer finish for the protection of metal, wood, and concrete against corrosion from exposure to moisture, acids. alkalis, and many other distintegrating elements is now being marketed by the Industrial P-5 Division, The Watson-Standard Co., Pittsburgh 12, Pa. Recommended for industrial application where protection against deterioration of surfaces is essential, the finish, it is claimed, can be used on cement, metals, or architectural surfaces with equal success.

In addition to its chemical resistance, Watson-Standard P-5 Finish is said to be free from objectionable odors, nontoxic, and to dry by evaporation without requiring any oxidation. It has good thermal stability, is highly resistant to abrasion and scrubbing, possesses desirable aging characteristics, and does not oxidize or become brittle, the manufacturer states. P-5 is available in nine colors.

Shelburne 45 Undercoater

An improved spray gun for use with heavy material, designated as the Shelburne 45 Undercoater, has been announced by the A. Shelburne Co., 739 Ceres Ave., Los Angeles, Calif. The gun is designed primarily for use with underseal compounds but can also be used with other types of heavy materials.



Shelburne 45 Undercoater

According to the manufacturer, the Shelburne 45 Undercoater is unusually light and easy to handle, non-leaking, and features an enclosed straightline action trigger for effortless two-finger operation. It is also equipped with a built-in air control valve. To clean the gun, the spray head assembly is merely unscrewed with the fingers and the needle valve pulled out; no wrench is said to be required.

Magnus Superfinishing Compounds

The Magnus Chemical Co., Inc., Industrial Processing Div., Garwood, N. J., announces the development of a technique for the application of diamond grit to a full range of finishing operations. The technique, which utilizes colored premixed diamond compounds available in tube or stick form, is said to be applicable to any shaped molds and cavities for steel, plastics, and other materials; plug gages, punches, and other cylindrical tools; production parts; rolls for all types of foil and sheet; dies of all types and shapes, and other products.

Precision graded diamond grits are provided for instant use in scientifically proportoned compounds, which contain the proper percentage of diamond for each grade size. The compounds are supplied in eight particle sizes from approximately 120 microns for extra coarse cutting to approximately one micron for super high microfinishing, and are available in two forms. One is the stick form about the consistency of lipstick, and the other is in paste form in a tube. Each tube or stick is supplied with a case hardened steel roller for applying and spreading the compound.

Instant identification of the proper grit size and the precise use of the proper compounds in the most effective sequence are ensured by the provision of distinctive colors for each grade. Not only the tubes and sticks but each grit size is identified by color in the compound itself.

Magnus 8-Tube Superfinishing Compound Kit

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* **4316 Paul St., Phila., Pa.**

Announcing!
HIGH SOLIDS VINYLITE* RESIN FINISHES
BY Watson-Standard
THIS NEW PLANT . . . now completed, will be devoted exclusively to the production of Watson-Standard Vinyl Plastic Coatings.

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Manufacturers of
PAINTS • VARNISHES • INDUSTRIAL FINISHES AND LITHOGRAPH COATINGS

TOUGH JOB HEADQUARTERS
Prescription Finishes
Give us your metal coating problem. We guarantee you an answer based on your conditions, and not just a standardized formula.

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*VINYLITE is a trade mark of a unit of Union Carbide and Carbon Corporation

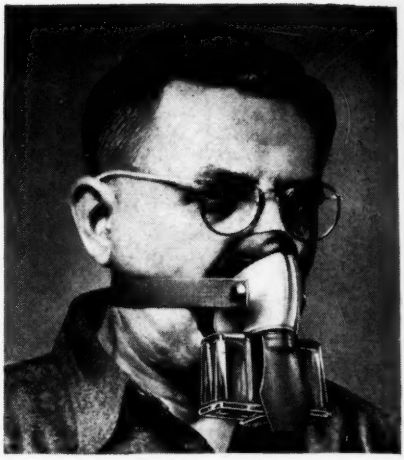
The eight grades of particle size are given eight individual colors. The roller for each grade is also individually colored to match the grit and tube or stick for which it is supplied.

Magnus Superfinishing Compound Kits are available in 6 or 8-tube or stick types in any desired combination of grit sizes.

M.S.A. Improved Clear-Vue Dustfoe Respirator

Designed to afford better wearing comfort and appearance with complete breathing protection, the M.S.A. Improved Clear-Vue Dustfoe Respirator now being offered by the Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa., is said to guard the wearer against every type of nuisance or harmful dust encountered in industry. Approved by the U. S. Bureau of Mines, the respirator has a facepiece of formable aluminum to ensure a comfortable fit on any face. A soft, flexible face cushion provides a dust-tight seal.

The filter container is made of tough, transparent plastic, permitting visual check of filter position, type, and condition. The economical, single, throwaway-type filters are colored to facilitate instant identification. The green Type AC filter has an especially low breathing resistance and is recommended for pneumoconlosis-producing and nuisance dusts and mists, and for heavy, fast-clogging dust concentrations. The All-Dust Type is red, providing maximum filtering efficiency against all dusts, and is recommended for protection against such toxic dusts as lead, cadmium, manganese, and so on.



M.S.A. Improved Clear-Vue Dustfoe Respirator

The M.S.A. Improved Clear-Vue Dustfoe Respirator has an adjustable elastic headband and an Army-type exhalation valve which, like the face cushion, are gray in color.

CUT DOWN REJECTS WITH ORVUS IN YOUR METAL CLEANING BATHS

You'll find this synthetic detergent effective
—as a wetting agent
—as an emulsifier
—in dispersing lime soaps which might cause poor plating if allowed to deposit on the metal
—in helping to reduce pitting in subsequent plating baths.

Write for further information about Orvus to

PROCTER & GAMBLE, Cincinnati 2, Ohio

"Blu-Blak" Metal Coloring Process

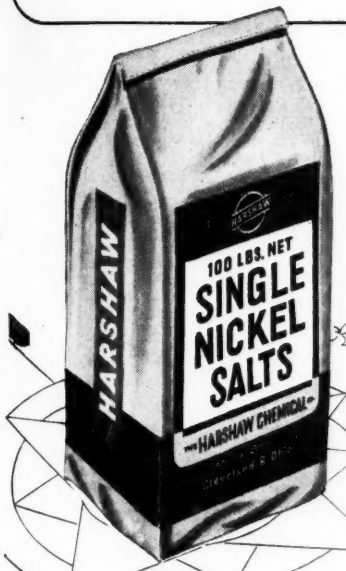
Protective Coatings, Inc., Box 3985, Detroit 27, Mich., announces an oxide coloring process for treating all types of steel, to be known as "Blu-Blak." The process is said to provide for the coloring of all steels to a deep, rich blue-black, including case-hardened and cyanide-hardened parts, at temperatures in the 250-295 deg. F. range. Parts are immersed in the bath for 15 to 60 minutes.

The Blu-Blak Process is said to color all steels in an assembly to a uniform color and to penetrate to a maximum

SINGLE NICKEL SALTS

Immediately Available

AT ALL HARSHAW BRANCHES



Additional production facilities have made it possible for us to carry ample stocks of single nickel salts at all our branches.

To save time and to speed up delivery, send your order to the nearest shipping point:

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Los Angeles 14, Cal. . 609 S. Grand Ave.
New York 17, N. Y. . 420 Lexington Ave.
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When you are ready to write your order, remember Harshaw Single Nickel Salts are far superior to the old large crystals, yet cost no more.

HARSHAW

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

depth of 0.0001 to 0.0004 inch, depending upon the hardness of the metal. The process is claimed to impart a color that improves with age, and a Blu-Blak bath can be used indefinitely without formation of sludge, it is stated. Foreign matter, such as oil, grease, dirt, and so on, rises to the surface of the bath where it can be easily skimmed off, thus leaving the solution clear and clean.

Blu-Baked steels are said to afford maximum abrasion resistance and immunity to corrosion in salt spray tests.

WAA Paint Products

Seven to eight million dollars' worth of surplus, government-owned paints, clear and pigmented lacquers, enamels, aircraft dopes, and related products are being offered for sale by War Assets Admaintenance finishes in the industrial are best suited for use as production or maintennace finishes in the industrial field.

Most of the paint products available were developed to meet military specifications. Depending on specification or grade, type or class within a specification, they have been formulated for application by the brush, spray, or dip method. Some of the products are formulated as air-drying or as combination air-drying and baking finishes; others are for baking only.

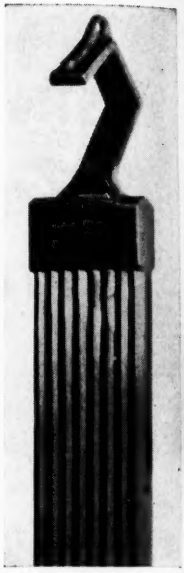
A wide range of colors is available, mostly in the earth, sea, and sky colors used by the military in gloss, semi-gloss, and lustreless finishes. These paint products are generally packaged in large size containers—55-gal, drums and 5-gal. containers. Smaller quanties are available in a few specifications on 1-gal. cans and smaller sizes.

These products are available in all WAA Regional Offices.

GOLD PLATING SOLUTIONS
In All Colors
Guaranteed 100% Pure Gold Content
Troy Weight - Color Constant
Tarnish Resistant
Proven Quality by the Acid Test
Write or call our experts about your plating problems
Davis-K-Products Co.
54 West 22nd St., New York 10, N. Y.
Oregon 4-4108
4-4109

Heil Special Heavy Duty Lead Anode

Taller and heavier than the average man, a special heavy duty lead anode which is said to be particularly adaptable for the fast plating of heavy metal work has been developed by the Heil Process Equipment Corp., 12901 Elmwood Ave., Cleveland 11, Ohio. The anode is provided with a special hook for hoisting in and out of large plating tanks employed for plating heavy metal work such as automobile bumpers and grillwork.



Heil Special Heavy Duty Lead Anode

As a result of its patented sawtooth design, the anode is claimed to possess unusual throwing power, as well as an extremely high current carrying capacity.

"Tygon" Air-Dry Rack Coating 266

"Tygon" Air-Dry Rack Coating 266, a material designed for the insulation and protection of plating racks and metal parts exposed to the corrosive conditions which are normally encountered in the cleaning and electrode position of metals, is announced by The U. S. Stoneware Co,. Akron 9, Ohio. An advantage of the coating is the minimum time required for application. Two dips of the plating rack in the material are said to be usually sufficient in order to provide for ample protection.

According to the manufacturer, Tygon Air-Dry Rack Coating 266 is resistant to all plating solutions, including hot alkaline cleaners, and requires only 20 to 30 minutes drying time per coat. The material, it is claimed, possesses excellent adhesion to all surfaces and is sufficiently flexible and resilient to withstand mechanical shock in handling.

DU-LITE PROTECTS THE "ALASKAN"

for Big Game Hunters

The Lyman Gun Sight Corporation has a high reputation among the world's big game hunters, from the African "cat" country to the crags of Alaska, for producing accurate, dependable precision sighting instruments for use on the world's finest hunting rifles.

Hunters hunt in every clime; they hunt in every kind of weather. To help keep their famed sights accurate in the field, Lyman finishes *all* their steel parts in DU-LITE Black Oxide Finish.

Lyman selects DU-LITE because it imparts to the gun sight a rust-resistant, oil-absorptive finish—factors essential to durability. And Lyman selects DU-LITE because it is imposed at non-critical temperatures and causes no dimensional changes in the finished parts — important considerations in close-tolerance manufacture.

DU-LITE will solve your steel finishing problems for you, too. Call or write. We will be glad to arrange for a DU-LITE Service Engineer to call on you at your convenience.

DO IT RIGHT WITH DU-LITE

DU-LITE CHEMICAL CORP.
100 River Rd., MIDDLETOWN, CONN.

Norgren Transparent Plastic Bowl Air Filter

A transparent plastic bowl air filter which is designed to eliminate oil emulsion, moisture, and solid impurities from

Norgren Transparent Plastic Bowl Air Filter

compressed air lines is announced by the C. A. Norgren Co., 222 Santa Fe Dr., Denver 9. Colo. Centrifugal force is utilized to separate moisture from the air. A double right-angle air inlet imparts a violent swirling motion to the air as it enters the filter bowl. This "separator-action" throws the moisture against the wall of the bowl where it collects and runs down into the "quiet zone" below the baffle plate.

A thin transparent plastic baffle, with holes on its periphery, divides the filter bowl into two zones—an active zone where separation takes place and a quiet zone where the moisture is allowed to accumulate instead of being driven along with the air. Through the transparent bowl the operator may actually see the moisture being separated and thus knows at all times whether or not accumulated muck in the quiet zone should be drained off through the bottom cock. Centered in the bowl and directly above the baffle plate is a 200 mesh reinforced Monel wire screen which separates all solid impurities from the air as it leaves the filter.

The Norgren Transparent Plastic Bowl Air Filter is offered in three sizes of ¼, ⅜, and ½-inch I. P., with all parts interchangeable between sizes with the exception of the body.

Plating Rack Service

The Artisan Co., 207 Division Ave., Brooklyn 2, N. Y., has established an economical plating rack service wherein rack frames are welded throughout, thus assuring maximum rigidity and durability. A carefully planned system of detachable contacts enables a sturdy rack frame to be used over an indefinite period. New contacts are installed at the factory, thus ever-varying items can be readily accommodated.

Prufcoat Protective Coatings. A four-page illustrated folder describing its line of protective coatings is now being issued by Prufcoat Laboratories, Inc., 63 Main St., Cambridge 42, Mass. The folder lists features of Prufcoat, chemical agents which Prufcoat resists, an interesting variety of actual case histories, as well as Prufcoat uses and complete application information. Copy free upon request.

WE RECOVER YOUR
SOLVENTS and THINNERS
from Sludge, Waste, Wash,
Spoiled Lacquers, etc.
AND SAVE YOU MONEY
Each shipment—one drum or a carload—receives PROPER and SEPARATE TREATMENT.
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ALLWOOD
"Vienna Brand" Lime
Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.
WRITE FOR FULL PARTICULARS
ALLWOOD LIME COMPANY
Manitowoc • Wisconsin

CORROSION RESISTANCE

That's More Than Skin Deep

It's HAVEG

All The Way Through

Corrosion eats into profits by eating into equipment—resulting in heavy maintenance and replacement costs.

Reduce that expense by using HAVEG for process equipment wherever possible—for tanks, towers, coolers, piping, valves, pumps, fume ducts and similar applications.

HAVEG is a molded structural material resistant to chemical action throughout its entire mass. *It is not a lining or coating* to become ineffective when damaged by surface abrasions or scratches.

Bulletin F-5 gives complete design, engineering and application data. Send for it today.

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FACTORY MARSHALLTON, DELAWARE

CLEVELAND 14 — 330 Leader Building

CHICAGO 11 — 1201 Palmolive Bldg.

HOUSTON 6 — Consolidated Bldg.

DETROIT 11 — 2632 E. Grand Blvd.

LOS ANGELES 13 — 601 W. Fifth St.

The Finishing Touch — By J. A. Patterson

"Hello, Ajax Laundry?"